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APRIL 1937

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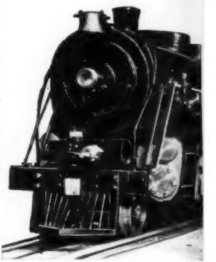

Toot! Toot! A. C. Kaimbach, nationally known authority on the subject, describes America's boom in model railroads in the May issue of MM. His article will interest you whether or not you are one of the 25,000 old and young persons who are now actively pursuing this fascinating hobby. Don't miss the May issue on sale April 1.

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Published monthly by Modern Mechanix Publishing Co., Fawcett Bldg., Greenwich, Conn., U. S. A. Entered as second-class matter under the Act of March 3, 1879, at the post office in Greenwich, Conn., with additional entry at Louisville, Ky. Not responsible for unsolicited manuscripts. Contributions accompanied by insufficient postage will not be returned. In U. S. and Possessions and in Canada, 15c a copy; $1.50 a year. Other Postal Unions, $2.00 a year. Printed in U. S. A. Advertising forms close the first of second month preceding date of issue. Advertising offices: New York, 1501 Broadway; Chicago, 200 N. Michigan Ave.; San Francisco, Simpson-Reilly, 1014 Russ Bldg.; Los Angeles, Simpson-Reilly, 536 S. Hill St. Member Audit Bureau of Circulations. **Editor**, Tom Mahoney; **Associate Editors**, Thomas A. Blanchard, John L. Sehorer, Clifford Peters; **Hunting and Fishing Editor**, Robert Page Lincoln; **Naval Architect**, S. S. Rabl; **Art Director**, Al Allard. Photos by Acme, Globe, International Pictures, Underwood, Wide World services.

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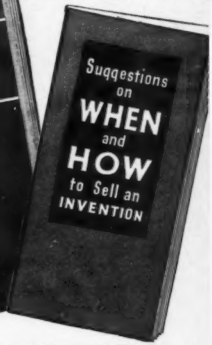

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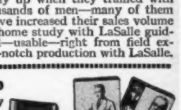

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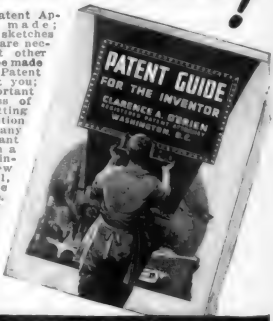

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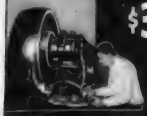

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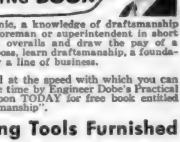

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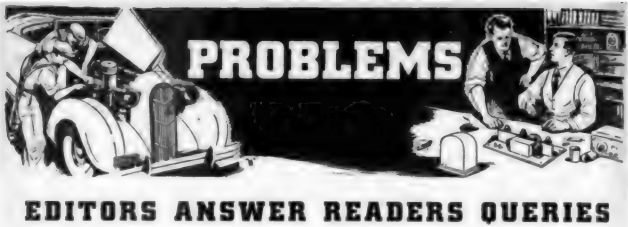

EDITORS ANSWER READERS QUERIES

OPERATING GARAGE DOOR BY PHOTO CELL

Is there some simple method by which I can open my garage doors by photo-electric cell? Where can I secure plans for the construction of the cell, itself?—Kenneth Brewer, Piedmont, Mo.

In order to successfully operate a garage door by photo-electric beam the door must first operate by some mechanical means. A mechanical arrangement such as was described in the September 1936 issue of MM on pages 96 and 97 could be employed for photo-cell operation. The photo cell should be connected through a relay to a solenoid coil which would be strong enough to trip the weights operating the door. The design of this arrangement, of course, must be left to the builder. Plans for a simple photo cell will be found in the Radio Builder's Manual which is available from MM at 50c.

DECORATING WOOD ARTICLES WITH BURNED FINISH

If I remember correctly MM carried an article several years ago on decorating articles made of wood with burned designs. While this hobby has not been popular for the past few years it is gradually staging a comeback. Can you tell me where I might secure some information on this subject which would help me in producing this burned finish?—Harold Hanson, Atlanta, Ga.

Finishing woods by burning them is a stunt which had its origin in Japan. Commonly known as "Sugi" this finish is rapidly gaining favor among workshop fans. We believe that the article on page 93 of our January issue will help you in producing this novel wood finish.

IRON SUITABLE FOR TRANSFORMER LAMINATIONS

What type of common steel or iron can I use in place of silicon steel for making transformer cores? Would there be any effect in the operation of a transformer made from a substitute metal? What is the common name used for a substitute for silicon steel?—Frank Neuklis, Tamaqua, Pa.

Eddy currents are the chief reason for silicon steel fling used in the making of transformer cores. Each section or lamination of the core is coated with a thin insulating film so that each seement is an electromagnet when current passes through the coil. In this manner the coil sections repel each other and the heat factor is kept at minimum.

A fair substitute of silicon steel is ordinary black stove-pipe sheet iron. This can be obtained at any hardware supply house and cut up into transformer laminations to the dimensions required.

PRODUCING A VACUUM IN METAL VIAL

Can you advise me as to whether or not it is possible to pump the air from a small iron cylinder to obtain a complete vacuum? I wish to seal the cylinder after the air has been drawn out. Is this possible?—Joseph Jacksha, Council Bluffs, Iowa.

To seal a metal tube after the air has been removed from it involves elaborate machinery and cannot be successfully performed without such equipment. Of course, a valve could be attached to the cylinder and the pin closed after the air had been removed with a vacuum pump. To spot weld the hole through which the air is drawn would require special equipment.

CORRECTING REACTANCE COIL DIFFICULTIES

After building the reactance coil which appeared in the February issue of MM I find that I cannot use the unit for brazing. Can you offer a suggestion as to what my difficulties may be?—C. E. Jones, Edenburg, Pa.

The reactance coil in the February MM is intended only for use with carbon arcs. Where light brazing and soldering is to be handled the coil should be increased in size by adding an additional 150 feet of No. 10 or 12 D. C. C. wire and enlarging the iron core proportionately.

SNOWMOBILE DRIVEN BY T FORD ENGINE

Can you tell me where I might obtain plans for building a snowmobile that could be driven with a Model T Ford engine and fitted with skis for use on hard packed snow?—Victor F. B. Webb, Jasper, Alberta, Canada.

Plans for a streamlined ice sled appear in the February 1937 issue of MM. Although intended for use on ice it can be readily converted for use with skis. This craft is powered with a model T motor and should be ideally suited for your requirements.

YOUR PROBLEMS ANSWERED

Your problems will be answered by MM's experts without cost provided you limit your letter to 50 words. Please do not ask for trade secrets or plans on patented devices; we are not permitted to furnish this kind of information. Names and addresses of the manufacturers of the various new products described in this issue are also available free upon receipt of a self-addressed and stamped envelope. Address: Problems Editor, Modern Mechanix, Greenwich, Conn.

HIS WIFE WAS ILL. HE WAS RUSHING TO HER...WHEN BANG! ...A BLOW-OUT!

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But Lady Luck smiled that night—and the extent of Constable Stilling's injury was a wrenched shoulder. Some miracle had saved him. As he, himself, says: "I feel now that I am living on 'borrowed time'."

Just stop to consider what happens to your tires when you're skimming over the pavements at 50, 60 miles an hour. Naturally, the heat generated is terrific, and you're totally unaware of it because the trouble begins *inside* the tire. A tiny invisible blister may form between the rubber and the fabric. This blister keeps getting bigger and BIGGER until BANG! And then it may be too late.

It seems to me that, as far as *safer* tires are concerned, the greatest single contribution has been from Goodrich engineers. They have developed a real blow-out protection called the Golden Ply.

It is a layer of special rubber and full-floating cords, scientifically treated to resist internal tire heat. You can easily see what this means. Blisters don't get a chance to form between the rubber and fabric inside your tires . . . and that means blow-outs due to this heat don't get started.

You can be sure that Constable Stilling doesn't take any chances with his tires these days. He's ready for any emergency and so are his Goodrich Silvertown Tires. Remember, you can buy these life-saving Silvertowns at Goodrich Silvertown Stores and Goodrich dealers everywhere.

Rex Beach

Goodrich SAFETY Silvertown

With Life-Saver Golden Ply Blow-Out Protection

BETTER THAN A GOV'T PENSION!

I'll show you how to collect dividends this year

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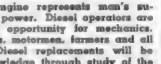
DIESEL POWER



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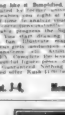

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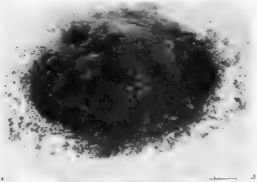

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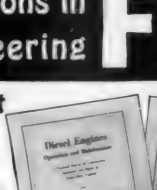

At your leisure in your own home, read these 2 Diesel lessons carefully. Judge for yourself our ability to teach—and your ability to learn—this fast-growing new line of work.

No Previous Experience Necessary

See for yourself how *practical* American School training is—how clearly every fact is presented—how *thoroughly* you can master Diesel through home study.

Diesel—the New, Fast-Growing Power

Is Your Job Safe?

Just as the gasoline engine changed or wiped out the jobs of thousands who depended on horse-drawn vehicles for their living—just as electricity changed the entire set-up in the fields of light and power—so now the Diesel engine is fast invading both the power and transportation fields, and threatening the present jobs of thousands of workers.

If jobs in your line are steadily growing scarcer, you owe it to yourself to investigate this new, progressive, uncrowded line, that in our opinion will offer good openings for the next 25 years.

Diesel engines—because of their high efficiency, dependability, and economy of operation—are fast replacing steam and gasoline engines in power plants, motor trucks and buses, locomotives and ships, aircraft, dredges, drills, pumps, etc.—opening up an increasing number of well-paid jobs for Diesel-trained men. The field of Diesel Engineering is on the upgrade and continually expanding. It will provide steady employment, advancement and good pay for those properly trained in this new industry.

What This New Field Offers You

Now is your chance to get into a big new industry and grow up with it to an important position. Today there is practically no competition in the Diesel field, but the increasing use of Diesel engines will result in keen competition for jobs in the near future. By starting your training now, you can keep ahead of such competition.

You get complete information on all the latest Diesel developments—two- and four-stroke cycles; low- and high-speed and heavy duty types; Diesel-electric generating systems, etc.—in our course. Includes all text material—with special diagrams for quick understanding of this new power.

Real Opportunities for Trained Men

Get our Free Diesel Booklet and learn all about this new, fast-growing line—its opportunities and requirements. Find out what the Diesel field offers you—how rapidly the Diesel industry has developed during the last three years—the large number of Diesel engines and accessories being manufactured today—how quickly you can obtain a complete understanding of Diesel engine principles and operation by home study during your spare time! . . . at your own pace—without interfering with your regular work.

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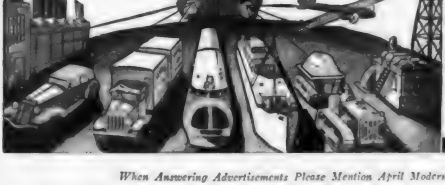

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When you learn what worthwhile opportunities Diesel offers and how readily you can cash in on them through American School training, it may mark the turning point in your life. Asking for full information involves NO obligation—so write TODAY for FREE lessons and FULL information.

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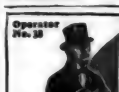

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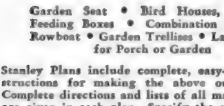

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Institute.

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TRAIN NOW FOR GOOD PAY FULL-TIME AND SPARE-TIME JOBS THAT PAY UP TO $75 A WEEK (and more)

Radio is still forging ahead. 1936 beats all other years. Over 6 million new sets sold. Over 30 million dollars paid for service alone in 1935. Where only a few hundred men were employed a short time ago, thousands are employed today. And where a hundred jobs paid up to $75 a week—there are thousands of such jobs today—many paying even more. And new jobs are being created all the time—**full time jobs and spare time jobs.** Get my book and see how easy it is to learn at home for this good-pay work.

"Shop Training" for the Home

R-T-I Training is different than any training you ever heard about. It comes to you right from the heart of the Radio Industry—right out of the factories where Radio sets and other vacuum-tube devices are made. It was planned and prepared and is supervised by big radio engineers IN these factories—by men appointed for the purpose. This means that trained the R-T-I way, you'll be trained as the Radio Industry wants you trained—just as the Radio Industry, itself, would train you if it was doing the job.

Television, Photo Electric Cells, Public Address Systems Included

Radio service work is only the starting point in R-T-I Training. From there it will take you through the whole field of Radio and Electronics. You will learn about every new development, including Television, so you'll be ready when Television breaks. You'll also learn the big money subjects such as Aviation and Auto Radio; Public Address Systems; how to handle Photo Cells; Sound Picture Recording, Etc.

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Start almost at once doing part time radio work. I furnish 4 outfits of apparatus that you build into test equipment with which you can do actual jobs and earn extra money. My Training pays its own way and you get your money back if not satisfied.

Age or Lack of Experience Ne Handicap

You don't have to be a high school graduate, nor even have finished the grades. My Training is so simple, easy, and practical, that the average man, regardless of age, education, or previous experience can master it. It offers the chance you have wanted to get out of a small-pay, no-future job, into good pay work with a future, in Radio and all its branches.

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INVESTIGATE! Learn why R-T-I Training is different. Find out why R-T-I Trained men get "Quick Results" and "Big Results." Send for your copy of "Radio's Future and Your Opportunity" today. It tells you about Radio's amazing opportunities. It describes my approved training. It tells what R-T-I students are doing and making. It gives the history of my Advisory Board and 50 endorsing manufacturers. It's FREE. Clip, sign and mail coupon RIGHT NOW!

RAY D. SMITH, President

RADIO AND TELEVISION INSTITUTE

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Wm. T. Ridd, Verdun, P. Q., Canada, formerly an $18 a week car washer, averages more than $75 a week as an R-T-I Trained man. He says: "Have made $250 in single week. R-T-I is entirely responsible for my success.

STARTING SALARY HIGHEST HE EVER EARNED

Harold Apley, 2658 Brookside Ave., Indianapolis, made as high as $30 a week in spare time while getting his R-T-I training. Starting on a regular job, obtained because of his training he said: "This job is starting me in at better pay than I ever got on any job before."

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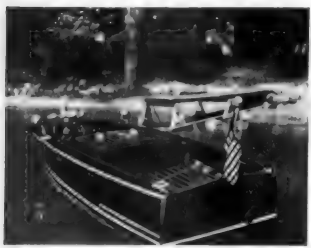

Professional in appearance and craftmanship, this runabout built from plans in the MM boat book by William Fruechtenicht, Jr., of Bloomington, Ind., speeds along at 33 m.p.h.

FROM home workshops throughout the U. S. and several foreign countries letters and photos of interesting projects completed by MM readers have been received by the Workbench. Indeed, one of the hardest jobs is to select the monthly prize winners from the many fine contributions sent in.

Many photos received, although not current prize winners, are held for possible future use. Send in the letters and photos of your projects, readers, and follow the Workbench. YOUR project may be one of the winners selected next month.

***

Leading this month's list of winning project letters and photos is one from William Fruechtenicht, Jr., of Bloomington, Ind., who writes:

Bloomington, Ind.

Dear Editor:

Enclosed is a photo of the runabout SCRAM which I built, alone, from MM boat book plans during my senior year in high school. I have been amply repaid by the craft's performance and service for the time and expense involved in constructing it.

The hull is built exactly to specifications and is powered with a converted high speed Model A motor, giving a speed of 33 m. p. h.

William Fruechtenicht, Jr.

We are pleased to know that MM boat book plans were used in the building of Fruechtenicht's runabout. It certainly is professional looking in construction and first prize of $5 is awarded to him in recognition of a job well done.

Gasoline powered airplane models are finding great favor with aviation fans and a $3 prize was awarded to Francis Kosanda, of Hopkins, Minn., for his interesting letter:

Hopkins, Minn.

Dear Editor:

Enclosed is a photo of a gas powered model airplane built by Robert Apgar, of Minneapolis, and myself. It is of original design and powered with a G. H. Q. motor.

The model weighs five and one-half pounds, has a wing span of nine feet, and an aspect ratio of 8-1. On a test flight the model went out of sight after ten minutes, but was later recovered from a tree overhanging the Mississippi River.

Your articles on gas engines, gas models, and model airplanes are excellent.

Francis Kosanda.

Judging from the report, the gas model must be an excellent cloud chaser and we are glad it was recovered without serious damage.

Many letters have been received praising MM model articles and we promise more of them in the future.

***

Workshop fans who have built, or are building, aero ice sleds will be interested in a letter sent in by Walter H. Foss, of Beverly, Mass., which was awarded a $3 prize. He writes:

Beverly, Mass.

Dear Editor:

Enclosed are photos of my aero ice sled which I designed and built in my attic workshop.

The body is of wood and covered with bleached airplane-doped muslin. Aluminum paint with red trimmings give it a neat appearance.

The sled is powered with a motorcycle engine turning

Francis Kosanda, of Hopkins, Minn., holds gasoline powered model he and Robert Apgar constructed. On its initial flight, the 9-foot model flew out of sight but was recovered again.

the Editor's Workbench

a 51-inch propeller at 2500 r. p. m., giving a speed of 60 m. p. h. The motor is covered with sheet aluminum.

Two rudder fins mounted at the rear serve to guide the sled in a high wind and to protect bystanders from the propeller blades.

Walter H. Foss

Foss has built a sled of novel but clean cut design. Lucky are friends who may be invited to occupy the passenger cockpit of the speedy craft.

***

From Eduardo Ventosa, of Puebla, Pue, Mexico, came a letter and photos that won an award of $3. His letter says:

Puebla, Pue, Mexico.

Dear Editor:

Am enclosing several photos of an automobile I constructed and hope they will interest you. The auto embodys aerodynamic design and has an Austin motor.

Standing 4 feet, 7 inches high, the weight of the car is about 800 pounds. The transmission features two reverse speeds.

Eduardo Ventosa.

Ventosa's small auto certainly is of unusual appearance. We can readily imagine the curiosity aroused when he parks in some public place.

Featuring an aerodynamically designed body and powered by an Austin motor, the small auto shown above was built by Eduardo Ventosa, an MM reader in Puebla, Pue, Mexico. The car has two reverse speeds and stands 4 feet, 7 inches high. Right—From above, the unusual auto presents the appearance of an elongated human skull due to its long hood, curved windshields, and dome-shaped body.

***

A letter received from Harold L. McCarten, of Rockford, Ill., will undoubtedly interest many readers.

Rockford, Ill.

Dear Editor:

I believe a simple reference file of articles that have appeared in MM would be welcomed by many readers. I have spent many hours looking over past issues for an article I knew had appeared.

If an index of some kind can be worked out, I'd like to see it. Don't change the magazine, though, for its a dandy and I couldn't do without it.

Harold L. McCarten.

We thank McCarten for his kind words of praise and are pleased to announce that an index of articles that have appeared in MM issues from November 1935 to October 1936 is now available. Readers desiring a copy of the index can secure one by sending ten cents to Modern Mechanix, Greenwich, Conn.

***

Albert Roseberry, of Columbus, Ohio, sent in a letter and photo of an ice boat that won an award of $3. He says:

Columbus, Ohio.

Dear Editor:

I am enclosing a photo of my ice boat. It was built from plans in the MM "How To Build 20 Boats" book

[Continued on page 26]

This two-seater aero ice sled was built by Walter H. Foss, of Beverly, Mass. (rear cockpit), shown taking a friend for a ride. Twin rudders steer craft and form propeller guard.

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Editor's Workbench Chips

[*Continued from page 25*]

Ready to take advantage of the slightest wind, this ice boat was built by Albert Roseberry, of Columbus, Ohio, from plans in the MM boat book. It has a windshield to protect riders.

and handles very nicely, although I plan to enlarge the sails next winter.

Albert Roseberry.

Roseberry's ice boat looks good to us and we hope he will be able to secure even better performance when he gets the larger sails.

***

William McFee, author of "Ships that Vanish" in this issue, is regarded by many as the foremost living sea writer. Born in London, he spent his early years on the water amassing a wealth of personal experience which he began to use in books with "An Ocean Tramp," published in 1908. His works include "Casuals of the Sea," "Sailors of Fortune," and "The Beachcomber." He lives in Westport, Conn., and contributes a weekly marine article to the *New York Sun*.

The thought in our guest editorial this month was first expressed by Mr. Hoover in an address to the annual convention of the International Association for Identification at Dallas, Tex. Stuart Whitehouse, author of the Grand Coulee article, writes for the *Seattle Star*. Richard G. Berger lives in Bridgeport, Conn. After his service with Edison, described in this issue, he rose from seaman to lieutenant, junior grade, in the Navy. For the last 10 years, he has been a stock broker but still does experimental work as a hobby. Donald C. Cooley, author of the sound effects article, is science editor of the *Literary Digest*.

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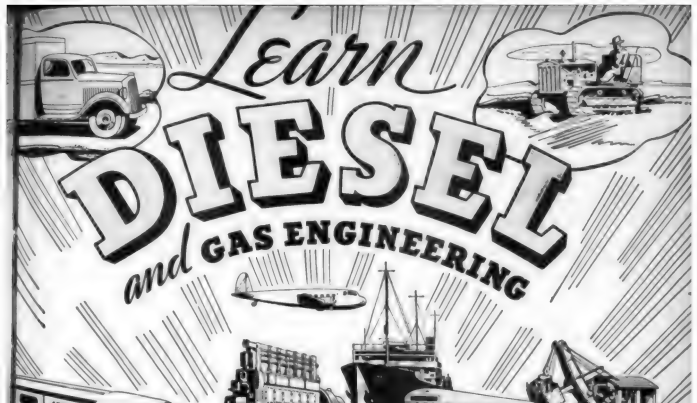

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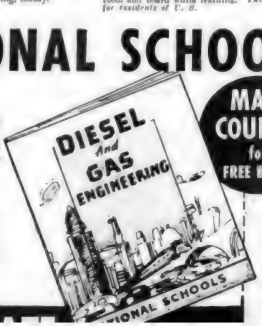

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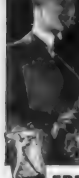

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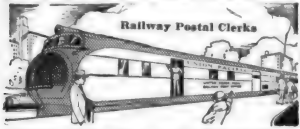

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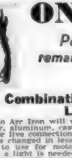

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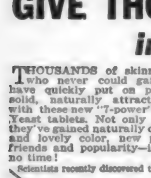

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YOUR FINGERPRINTS

A Guest Editorial

—Bachrach Photo

J. EDGAR HOOVER

AMERICA can have widespread fingerprint identification only through education concerning its benefits. Here is an agency which can be looked upon by the average citizen as proof of identity and of good standing in a community. It must be looked upon as his protector in case of accident, amnesia, loss of identity or death, through circumstances which make his identification under ordinary means impossible.

As conditions exist today, the criminal who is found dead may be returned to his loved ones for decent burial and for the eradication of the uncertainty, the worries, the fears and torments which descend upon a family when one of its members has been lost for years. However, the honest citizen who dies under such circumstances and who is not protected by his fingerprint identification goes to a grave in a potter's field and his family sorrows for years in ignorance of his fate.

It costs nothing to file a civil fingerprint card in the Federal Bureau of Investigation in Washington. There are now cards of 200,000 reputable citizens on file. A total of 600 such cards are being received every day.

There is no stigma to such a method of identification. It is a badge of honor. It should give one a standing in the community. It should be a letter of recommendation to any bank or insurance or business institution, and it should be the duty of good citizens everywhere to assume the leadership in this movement by preaching its usefulness to employees and friends everywhere.

J. Edgar Hoover

DIRECTOR

Federal Bureau of Investigation

SHIPS That

The Danish *Kobenhaven*, largest sailing ship in the world, vanished into the unknown after leaving the River Platte on December 14, 1929, for Melbourne, Australia. Though the vessel carried radio equipment and auxiliary engines her fate and that of the cadets aboard her is still a mystery of the deep.

IN THESE days, when almost every boy has a radio, and even harbor tow-boats are in communication with the shore office by radio telephones, it sounds strange to say that ships still go to sea without radio equipment. Policemen in Ford cars are listening in on headquarters and television at home is creeping up on us, yet ships are allowed to go to sea legally without even a receiver.

It is only a few months since a ship with passengers vanished in the Florida channel and she was as completely cut off from the world as was Columbus when he sailed into the unknown west. It is only a year and a half since a brand new British freighter sailed from England to the westward with a cargo of coal on her maiden voyage, and vanished with all hands. She carried no radio. Built in England for service on the Great Lakes, the vessel was exempt by British law from fitting wireless for the Atlantic voyage.

While the *Vestris* was sending out desperate calls for assistance and fighting for her life in November 1928, and the answering ships were driving through the storm to reach her in time, a small freighter without wireless passed close by her in the night, and might have saved her. But the master of the freighter knew nothing about the disaster until he read of it weeks later in the papers.

With all our modern mechanical and electrical marvels, ships continue to go out into the dark, they are spoken by passing vessels, they answer radio calls, and then there is silence. In the underwriter's records they are "not since heard of." They are posted as "missing" at Lloyds, and the big bell booms. Seventeen times in the past five years this has happened, but only to small cargo boats. It is easier for a land plane or an automobile to disappear than for a modern passenger vessel. She is in practically continuous contact with the shore and other ships.

It was not always so. It seems astonishing to us now, but at the beginning of radio, when Marconi was renting small equipment to ships, the big companies regarded it with skepticism and distrust. There was, of course, a great deal of static and sometimes nothing at all could be heard.

Thirty years ago, while I was fourth engineer of a ship that carried chilled meat from Buenos Aires to London, a brand new mail and passenger ship was launched in the Clyde, ran her trials at around 13 knots, classed A.1 at Lloyds, and made a successful maiden voyage to Australia and back to London via the Cape. This was the *Waratah* of the Blue Anchor Line. But although the meat ship carried no passengers she had wire-

VANISH

By
William McFee
Noted Sea Writer

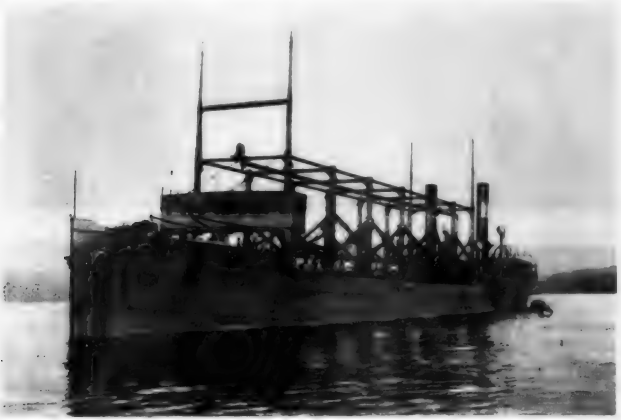
less, a small set with a range of sending up to 200 miles and receiving up to 400 miles. She carried one operator, and while he was asleep the officer on the bridge was supposed to go into the radio room every few minutes, put on the earphones and listen. If he heard Morse signals he had to call the radio man, who would then listen in and take the message. This was considered up-to-date radio practice in those days. But the *Waratah*, 16,800 tons, twin screw and inspected for passenger and emigrant service, had no wireless.

Why was this? Simply because the chilled meat was a valuable, perishable cargo, and it was important to have accurate advance news of her position before arrival. Wireless was not considered of any particular value for safety of passengers.

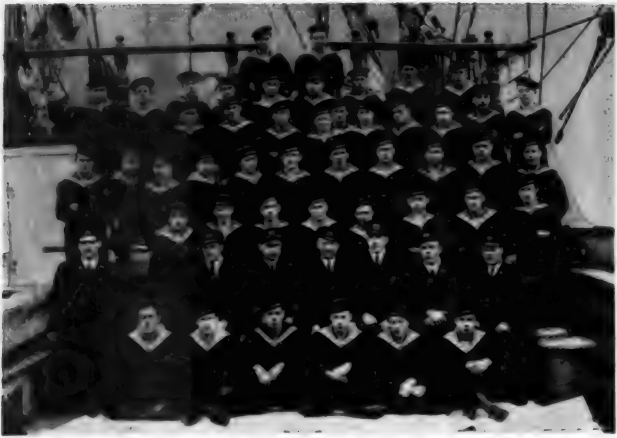
It is very rarely that such an extraordinary mystery as the *Waratah's* disappearance ever gets into the record. I can recall a small fruit ship, the *Marowijne*, with 97 souls on board, which vanished in the Gulf of Mexico in 1915, but it could not be called a mystery, for she was caught in a hurricane and lacked the size and stability to stand such a terrific wind. The *Waratah* was a good sized ship. She vanished, and not even a grating or a life buoy was ever found from her.

She was homeward bound from Australia and coaled at Durban, South Africa, on July 25, 1909. She had all the officers she had carried on her first voyage except one junior mate and two engineers. Leaving Durban with 10,000 tons of cargo and 92 passengers on board, she headed westward for Cape Town, her last call before turning north for England. While passing the *Clan MacIntyre*, an 11-knot freighter from Indian ports, the two ships spoke by Morse signal. All was well on board. The *Waratah* steamed on ahead. When the *Clan MacIntyre* lost sight of her that night she vanished from the world.

The *Clan* followed and after a southwesterly gale ran into a northwesterly wind that became a hurricane. She sighted ten other



Nineteen years have failed to explain definitely the disappearance of the *Cyclops*, shown here with her towering equipment for coaling United States battleships at sea. Naval craft searched every West Indian port in vain for a trace of this collier.



These officers and cadets, many of them from the most prominent families of Denmark, vanished with the *Kobenhavn* when the five-masted steel bark disappeared in the South Atlantic en route to Australia. Grain was to have been loaded in Australia.

ships during the voyage to Cape Town and they all weathered the storm. None of them sighted any wreckage or dead bodies and it finally dawned on the people in Cape Town that a fine new steamer of nearly 17,000 tons, with over 200 souls on board, had gone to the bottom.

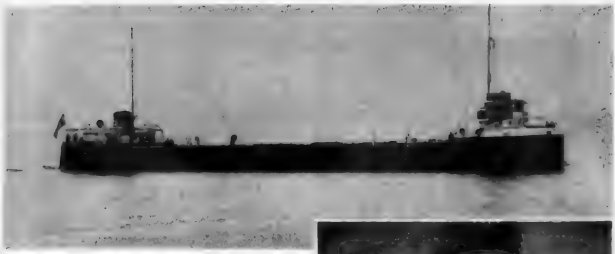
It was so hard to believe that a search was made for the *Waratah* more thorough than any organized before or since. Three British warships made a systematic survey of hundreds of square miles of ocean between the spot where she was last seen and Cape Town. The Australian government chartered a ship which sailed nearly 3,000 miles to and fro. The Blue Anchor Line chartered a ship, the *Sabine*, which cruised for nearly three months and logged 14,000 miles, all to no effect. The *Waratah* was gone, and her secret has been securely kept for 28 years.

What happened? One man's guess is as good as another's, but it so chanced that I was on another ship in Glasgow in 1910, tied up in the Queen's Dock at the foot of Finniestoun Street, in full view of the fitting-out basin of Barclay Curle and Co., the builders of the *Waratah*. There was another ship for the Blue Anchor Line fitting out at the time, and a young cousin of mine was an apprentice in the engine shops in the yard.

It was only natural that the conversation should turn to the *Waratah*, for my young cousin had worked on her engines in the shops and knew all about her sea trials. He said everybody in the yard knew she was extremely "tender." It took very little to make her list over. She had a high structure amidships accommodating the passengers, and carried a lot of heavy wooden lifeboats on account of her emigrant trade. She had a bunker with 600 tons of coal on the spar deck, and I was told the owners had insisted on an extra deck amidships, which was the cause of her being so tender.

Even so, why should a fine large ship capsize if she had already made a successful voyage and the captain, a man of 40 years experience, had lodged no complaints? Why should all five inspections — builders, owners, Lloyds, British Board of Trade and the Emigration Service, fail to discover the fact that she was not a safe ship? The leading experts in naval architecture declared she was a safe, well-designed ship.

Here again the evidence of one who has been through a hurricane blowing from the



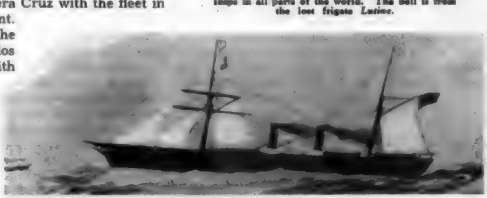
This motorship, the *Joseph Medill*, built for service on the Great Lakes vanished in the Atlantic on her maiden trip in 1935. No trace has been found of ship or crew.

north off the southwest coast of Africa may be offered in illustration. In 1906 one of those terrible winds caught my ship at anchor in an open roadstead and we were nearly blown on the reef before we could get steam enough to head into the gale. That ship was an humble tramp, very low in the water and loaded with nearly 6,000 tons of copper in her lower holds. She offered small resistance to the wind, yet her boats were lost or smashed, her deck steam pipes torn up, and her forecastle almost stove in. If the *Waratah*, with her boats 50 feet above the sea and a huge broadside area to the hurricane had been in that storm, all the naval architects in the world could not convince me that she would have survived. She was safe in all weathers except the type that comes once in 20 years or so off those coasts. She probably turned turtle and took everybody to the bottom.

A fate like this may have overtaken the United States collier *Cyclops*, whose disappearance is the classic American naval mystery of the World War. Built at Philadelphia in 1910 and of 19,000 tons displacement, this boat crossed the Atlantic safely in 1911 and went to Vera Cruz with the fleet in 1914 without incident. On March 4, 1918, the *Cyclops* left Barbados in the West Indies with

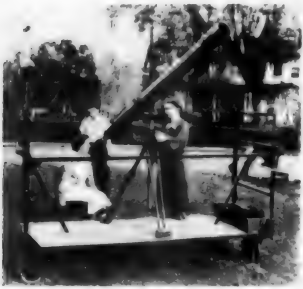
[*Continued on page* 147]

The famous Lutine bell at Lloyd's in London on which a caller rings good and bad news of overdue ships in all parts of the world. The bell is from the lost frigate *Lutine*.



An old mystery of the sea is the fate of the *Pacific*. This Collins liner vanished without trace in 1856 with 288 persons aboard. Two years earlier the *City of Glasgow* disappeared with a total of 459.

Portable Telescope Aids Astronomy Students



Evelyn Hammond (left), Gladys Ware (center), and Martha Lester of Florida State College for Women demonstrate the portable telescope used by students for astronomical study.

A PORTABLE telescope, claimed to be one of the largest of its type in the world, enables students at the Florida State College for Women in Tallahassee to make astronomical observations from selected points throughout the state.

The telescope has a 5⅜-inch lens with a magnifying power of 50 to 350 times. A specially polarized eyepiece protects the students from glare when they make observations of sun spots. The telescope stand is equipped with tail and head lights, operated by a storage battery, so that the apparatus can be towed along the highway for night observations.

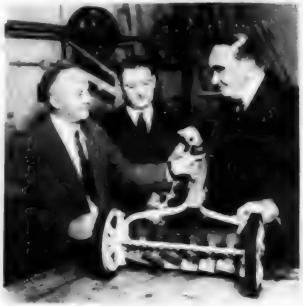
Plane Wing Carries 14 Men

SOVIET military aviators have converted an ordinary two-seater airplane into a troop transport carrying 14 soldiers by building a special compartment onto the bottom of the plane's lower wing. The men lie in a prone position within the compartment and are fully protected from the wind.

In test flights the converted plane carried 14 men and gas spreading equipment with a total weight of 4,400 pounds at a speed of 111 m.p.h. The plane will be used in time of war to land special troops behind enemy lines, a military strategy resembling Soviet experiments with mass parachuting of troops. The plane can also be used to transport wounded soldiers to base hospitals.

This two-seater Soviet military airplane was converted into a troop transport, carrying 14 men, by attaching a special compartment to lower wing. Hinged cover protects men from wind.

Lawn Mower Has 24 Blades



The 24 blades of this new type lawn mower cut grass and weed stems up to 10 inches in length. Kenneth D. Hauser (left) and Mac Wilkins (center), developers, present the first model produced to Geo. L. Baker, ex-mayor of Portland, Ore.

FEATURING 24 cutting blades, a new type of lawn mower has been developed by a manufacturer in Portland, Ore. The device is capable of making clean cuts of grass, weeds, and dandelions with stems up to 10 inches in length.

The cutting blades of the mower are riveted to the cutting reel, a construction that makes them continuously self-sharpening. The assembly of flexible tool steel assures proper alignment even when the mower contacts sticks or stones and blade edges meet the cutting bar clear across, not in spots. The first mower assembled was presented to George L. Baker, ex-mayor of Portland.

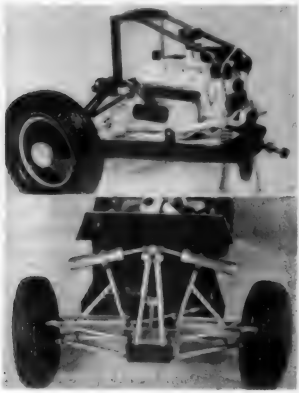
Generator Converts Liquid Gasoline To Dry Gas

OPERATING on dry gas, a new generator for auto or airplane engine use has been developed by A. E. Dobbs and Leslie Miller, of Miami, Florida. Miller is famous for his invention of an overhead valve mechanism for airplane engines.

The generator converts liquid gas into a dry gas, forming combustion after mixing with oxygen. It is claimed that in test flights using the generator liquid gas consumption was reduced 45%, heat reduced 50%, vibration lessened, and wear and tear on motor reduced.

Leslie Miller (left) and A. E. Dobbs, of Miami, Florida, examine generator they invented. Device converts liquid gasoline into dry gas for powering automobile or airplane engines.

Rear Mounted Power Unit



Auto frame (top) developed by Terry Hare, of Vancouver, B. C., features rear mounted power unit. Lower photo shows airplane-type knee action shock absorbers mounted at front.

A PRACTICAL auto frame featuring a rear mounted power unit has been developed by Terry Hare, of North Vancouver, B. C. The power unit can be disconnected and a new one installed in a few minutes, doing away with a tie-up during overhauls, a fact of great importance to truck fleet owners.

The frame has a new type of knee action gear fitted to its front end in which airplane-type oleo shock absorbers are carried in floating bearings. The framework supporting the shock absorbers is made of steel tubing.

Cloak Has 10,000 Feathers

VISITORS to Hawaii are much impressed with the beauty and craftsmanship of a feather cloak on exhibition at the Bishop Museum in Honolulu. It is estimated that feathers from 10,000 birds were used in making the cloak which originally belonged to Kamehameha III, once ruler of the Hawaiian Islands.

Feather cloaks were the symbol of royalty in Hawaii and birds were captured in the moulting season, the necessary feathers removed, and then set free again.

When Commodore Lawrence Kearny, of the U. S. Navy, visited Hawaii in 1843, Kamehameha III, presented the cloak to the naval officer as a token of his friendship and it is now known as the Kearny Cape.

This cloak is made of feathers from more than 10,000 birds. A symbol of Hawaiian royalty, the cloak was given to Commodore Lawrence Kearny, U. S. N., in 1843, as a token of friendship by Kamehameha III, once ruler of the Hawaiian Islands.

Final Work on

A midwinter view of the southwest corner of the $3,500 Modern Mechanix Model Home on East View Ave., Leonia, N. J. This is Tom's House as described in Mr. Bessell's series of articles. Photos by James Henry O'Brien.

Mr. Bessell, holding plans, checks with contractors on the casement windows and other details of the model low-priced home as it neared completion.

WITH his new $3,500 home virtually completed and the warm sunshine heralding the approach of spring, Tom and his wife began to give thought to beautifying the grounds of the residence built in Leonia, N. J., as the Modern Mechanix Model Home.

In addition to garden catalogs, they had for their guidance a garden layout with a key plan supplied them by their friend, Bill Johnson, a young architect with experience in such matters.

He had arranged the shrubs along a back line, and had placed in front of them the flowers that grow about four or five feet in height, such as hollyhocks, sunflowers and larkspur, then in front of these he had suggested beds of lower growing flowers such as coreopsis, snapdragon, columbine, lupin, spiderwort, poppies and phlox, and along the edge, or front row, the plan indicated the

MM Model Home

By Wesley S. Bessell
New York Architect

The architect and Tom Vonovich, contractor, are pictured examining the fireplace before plaster was applied to this part of the structure.

lower, or dwarf type, such as candytuft, bachelor buttons, lobelia, verbena, sweet alyssum, marigold, English daisy and sweet william.

It was wise, so Bill had said, to have successive planting so that there would always be some color in the garden from the early spring flowers, such as crocus, iris, tulips and jonquils until the late fall ending with the chrysanthemum. Along the shaded side where the garden seldom had sunlight there were shrubs suggested that grow well in such protection even to flowering, such as the mountain laurel and the rhodendodron, also the delicate lily-of-the-valley. On either side of the walk leading from the gate to the entrance door were two borders with iris, lupin, marigold, zinnias, and sweet petunias. These borders may vary according to the personal tastes, but it is well to have flowers that are long with bloom from the early to the late summer variety.

Fireplace detail in the living room, one of the notable interior features of the structure, after plaster was applied.

As a hedge Bill had suggested barberry, which is usually very colorful during the late fall, however, California privet or Japanese yew are excellent material. Some flowering shrubs located near the entrance gates add greatly to the general garden effect. These may be lilac or Japanese quince and wigelia. Berry bushes may be used within the confines of the garden as background and may be gooseberry or cultivated blackberry bushes.

Southern exposure of the New Jersey house as workers were completing the shingling and installing windows and doors. The Englewood Golf and Country club is nearby.

Bill had indicated a few trees for the property. On Tom's lot he showed a maple as these trees grow very rapidly, have heavy foliage, and if trimmed on the bottom branches make a delightful shade tree.

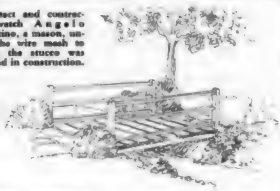
Another quick growing tree is the Lombardy poplar, but they do not last beyond 12 or 15 years, at which time they become scraggly and thin at lower branches. Tulip, beech and birch are interesting trees, especially the white birch, planted in groups of three or four. Among other trees that are ornamental and at the same time useful is the apple tree with its twisting trunk, and the pear tree. Also the oxheart cherry tree with its wide spread, but this tree also attracts the birds during its fruit bearing season, and they make much noise and chatter while picking at the fruit. Maple trees planted between the street and curb at 15 to 20 feet intervals are very desirable as shade trees along the street.

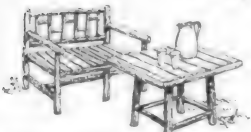
Bill suggested a broken bluestone walk. This may be laid on hard earth with space for grass between them, but a walk of this type has the disadvantage that it becomes uneven due to frost during the winter months. However, it may be placed on a cinder bed and made more practical, or if solidity is desired, set into a concrete base. Walks also are interesting in brick laid in numerous patterns, either flat or on edge. Among the designs that can be used are the herring bone and the basket weave. Brick walks should be laid on a good sand bed or in concrete to prevent unevenness. For the service walk to the kitchen use concrete; gravel walks are very interesting, and are suitable for a garden, but only for summer use, they have to be planked during the winter time.

A very simple little gate with two tall tapered posts was suggested for Tom at his entrance walk. Gates should have a spring to keep them shut, or be hung tilted so that they close naturally. A hinge cut on a slant will accomplish this.

Tom had his brook and planned this as a part of his entire garden, adding much to the attractiveness of it. As you opened the gate a few steps brought you to a wood bridge with railing on either side, the top one being a heavy two-inch by six-inch rail, with the lower ones of lighter material. The flooring of the bridge was left with a half-inch space between each plank permitting the rain to wash off. The bank of the brook was set up with rocks on a slope and into the crevices of the rocks Tom put water flowers, while along the upper bank he was going to plant vines which would run down to the water edge and form a green bowl through which the

Architect and contractor watch Angelo Christino, a mason, unroll the wire mesh to which the stucco was applied in construction.





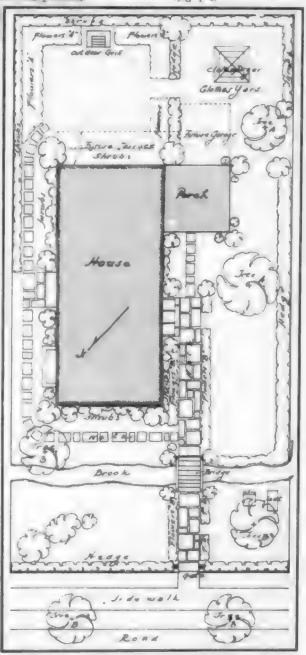
Drawings of brook bridge and garden furniture which Tom proposes to use in his landscaping plans.

brook would flow. Here and there stone steps lead down to a stone platform, and a tree in the far corner would eventually cast cool shadows affording a pleasant nook where one could sit and enjoy the brook.

To fully enjoy one's garden there must be garden furniture so Tom decided to make his own from straight rustic logs. Such furniture is very sturdy and may be made comfortable by using heavy straw mats or cushions. He also planned an outdoor grill.

On the plan Bill indicated a space for the clothes drying racks and yard. There are two methods that may be used, one is the four corner posts, and the other the single folding type that can be put away when not in use.

[*Continued on page* 140]



Planting plan for the Model Home. Flowers "A"—hollyhocks, sunflowers, larkspur, coreopsis, snapdragon, columbine. Flowers "B"—iris, lupin, zinnias, sweet petunias, tulips, jonquils. Trees—"A"—apple; "B"—maple.

Telephone Device Audibly Announces Exact Time

For use in telephone exchanges, this apparatus invented by John W. Wells, Stockton, Calif., responds to requests for correct time by audibly announcing same in hours and minutes.

DESIGNED primarily to reply to thousands of daily requests received by telephone exchanges for the correct time, a machine invented by John W. Wells, of Stockton, Calif., audibly announces the exact time at three second intervals. The device uses less than 20 feet of movie film to record a 24-hour cycle of hours and minutes.

The sound waves are transformed from the film by a scanning optic and a photo-electric cell which travels the length of the film and returns every six seconds. The time is announced in hours and minutes at every trip of the scanning unit.

Devise Time-Lock Recorder

TO ESTABLISH responsibility for the proper opening and closing of store doors, a self-contained lock mechanism has been developed by a New York City manufacturer of business machines. This device makes it possible to record when and by whom the door has been locked or unlocked.

Each employee is furnished an individually identified key which, when inserted in the lock, prints the time and identifying letters on a paper tape within the device. The recording tape can only be removed by an executive possessing a master key.

When employees insert specially made keys in lock mechanism shown at right, it prints their initials together with the time on a paper tape. Left—Executive checks tape recordings.

Giant Smoke Stack Erected

This 104-foot smoke stack was erected within half hour at Peoria, Ill., factory. Having a 57-inch diameter and weighing 10 tons, it is believed to be tallest pre-fabricated stack.

USING a mobile crane with an 84-foot boom, an all-welded, pre-fabricated smoke stack, 104 feet tall, was erected at a Peoria, Ill., factory of R. G. Le Tourneau, Inc., manufacturers of heavy grading equipment, in 30 minutes. The stack, made of one-quarter-inch plate, was anchored to the floor and roof of a boiler house.

MODERN EQUIPMENT EASES PRESIDENT'S LIFE

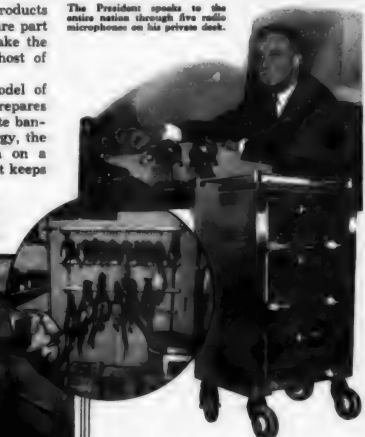
AN ARRAY of modern inventions, products of twentieth century ingenuity, are part of the White House equipment to make the President's day less strenuous. A host of mechanical aids are at hand.

The White House kitchen is a model of efficiency. A 24-foot electric range prepares a single pot of tea or a sumptuous state banquet. To conserve his time and energy, the President has lunch served to him on a specially designed wheeled cabinet. It keeps food ice cold or piping hot.

In the Oval Room, the Chief Executive can address the entire nation through five microphones that lead to the studios of leading broadcasting stations. A modern swimming pool serves to provide the President with his favorite exercise.

The President speaks to the entire nation through five radio microphones on his private desk.

Top—Swimming in this modern pool is the President's favorite exercise. Center—The White House kitchen is one of the world's best equipped. Bottom—The carpenter shop in the cellar.



Circle—Game from all over the nation is found in the White House refrigerator. Right—The President's lunch is served on a specially designed wheeled cabinet that keeps food hot or cold.

A complete carpenter shop, boasting latest equipment, is located in the cellar. It is used to make minor repairs in the executive mansion. Another room features a fully serviced motion picture theatre, sound equipped throughout.

The President's office day begins at 10:30 and ends at 5:30. Dinner is served at 7:45, and is followed by time spent in dictating correspondence that requires a personal answer, or in the preparation of speeches.

One of the latest White House arrangements is a room in which all incoming packages are examined by Secret Service men. The details of the room are kept secret from all but a few secret service officers and high ranking government officials.

John F. O'Connor, retired railway foreman of Chicago, Ill., is America's champion living inventor, holding 962 patents. Obtaining most of his technical education from correspondence schools, O'Connor has invented important railway devices.

Inventor A. S. Barclay, of Detroit, Mich., (left), explains construction of his multi-spar cellular airplane wing to Leo Goibach, noted test pilot. Wing withstands gun-fire.

Using odd parts, Lewis Larsen (above), of Minneapolis, Minn., invented rotary plow that lessens work of clearing snow from sidewalks. A 1/6 h. p. motor spins a four-bladed fan.

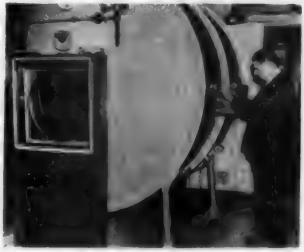
Lowell Kissel, of Eustice, Neb., demonstrates his radio guitar. Rubber mounted super-magnets pick up string vibrations and transmit them to amplifier with a tone control.

A new nozzle for fire hoses has been patented by Horace Barker, of Springfield, Mass. Nozzle has two sets of fins that reduce swirling motion of water, increasing range.

Ultra Violet Rays Used To Combat Influenza

AN ULTRA violet ray machine designed to combat the germs of influenza, common colds, and other ills has been developed by W. F. Wells, of the Harvard School of Public Health at Cambridge, Mass.

The machine has a tank in which germs are placed for observation. Ultra violet rays are directed through the tank and the killing power of the light rays upon the various types of germs is carefully noted. Results obtained from the experimental studies will be passed on to health bureaus throughout the country.



W. F. Wells, of Harvard School of Public Health adjusts ultra violet ray machine developed to combat influenza germs. Killing power of rays on germs in chamber is studied.

Giant Radio Has 37 Tubes

Developed by a Cincinnati, Ohio, radio manufacturer, this giant radio has 37 tubes, 6 speakers. Dorothy Greenwell holds microphone of the public address system inexperienced in set.

EQUIPPED with 37 tubes and six speakers, the largest of which is 18 inches in diameter, one of the largest radio sets in the world has been produced by a Cincinnati, Ohio, radio manufacturer. The set is nearly five feet high and weighs 475 pounds.

The huge radio has a tremendous volume range with a maximum output of 75 watts, yet it can be tuned down to normal living room volume without distortion of tone quality. Four chassis are required to mount the working elements.

The set is capable of reproducing from 20 to 20,000 cycles of audio frequency, although the normal human ear is incapable of hearing above 16,000. The dial of the receiver is 12 inches in diameter.

Master Motor Thermometer

FOR use in determining the most efficient propeller and engine characteristics for their planes, engineers of United Air Lines have developed an elaborate test panel desk for use aboard the giant air liners. The panel has a master thermometer with leads to 22 inaccessible, but vital, motor points.

When an airplane equipped with the test panel is in full flight, an engineer simply twirls a dial to get the temperature reading of any of the 22 points. A chart-guide informs the engineer as to what number to dial to secure a reading of any particular point. The device affords an accurate check on motor conditions at varying altitudes.

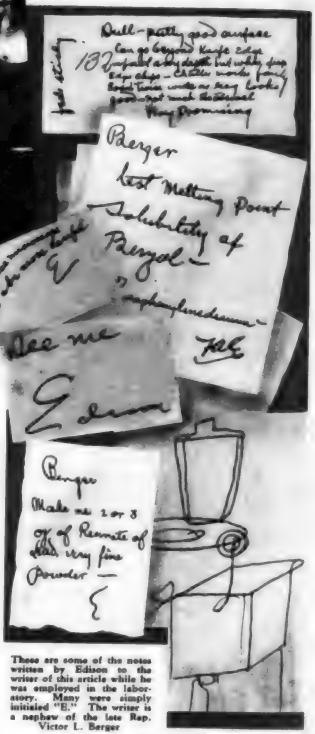
This master thermometer device aboard United Air Lines test plane enables H. O. West, maintenance superintendent, to check temperature at 22 inaccessible motor points.

Edison

by Richard G. Berger

A War Time Member

The late Thomas A. Edison, inventor of the incandescent lamp, the phonograph and countless other things, in his library.



These are some of the notes written by Edison to the writer of this article while he was employed in the laboratory. Many were simply initialed "E." The writer is a nephew of the late Rep. Victor L. Berger

IT WAS during the summer of 1916 just after my graduation from the Massachusetts Institute of Technology, that I read an article in *Munsey's Magazine* concerning Thomas A. Edison and his "Insomnia Squad." I immediately wrote to Mr. Edison requesting employment in his laboratory.

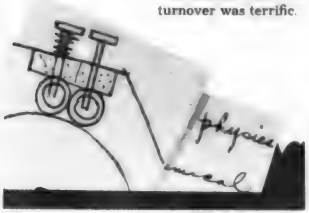
He was away on one of his annual Firestone-Burroughs vacation trips. Upon his return I received a letter stating that Mr. Edison offered me two weeks' trial employment in his laboratory at fifteen dollars per week. I accepted—in fact I would have taken the position without salary—and reported to the laboratory at West Orange, fully expecting to be back home at the end of the two weeks.

The sight of Mr. Edison with several days growth of beard and dressed in baggy clothes, vigorously chewing tobacco, set me at ease. He assigned me to work on various problems of phonograph record composition and the manufacture of phenol (carbolic acid) which

was then much in demand for both records and explosives.

Mr. Edison saw that I had plenty of work to do, and rewarded my solved problems by giving me twice as many new ones. He would lecture in his direct way on the evils of smoking cigarets, and of watching the clock. In fact, he would become quite angry at employees who quit work on time. I discovered also that he relished good stories.

Some of his men liked him. Many of them feared him. A few even disliked him. Some of the married men maintained that the long hours of work in the laboratory destroyed their home-life. Edison was dictator and labor turnover was terrific.



This picture of Edison's 1912 "insomnia" squad illustrated the magazine article which caused Richard G. Berger, right, to apply for a job with the inventor. Standing are McGlynn, Spahr and Al Hoffman; seated, Lamont, Fulton, Moore and Mr. Edison.

It was about 10:30 p. m. while I was at work in the laboratory with Mr. Edison, that his secretary called him. A half hour later Mr. Edison returned without his working coat, a broad grin lighting his face, and puffing away at a cigar. "I've just been awarded a new honor," he volunteered. "New York University has just given me a degree."

"What degree is it?" I asked.

He looked perplexed. "I don't know," he confessed, "anyhow it was the highest they had."

That same night, as he seemed loquacious, I expressed a desire to be a Nobel Prize winner. He informed me that I could--if I worked hard enough—and added that he himself would have been awarded a Nobel Prize except that he wouldn't comply with the necessary regulations and couldn't be bothered to travel to Sweden to call for it.

On another occasion when I asked him how many medals he had, he replied in his characteristic humorous manner, "about two quarts."

People have been curious sometimes concerning the Edison manner of experiment. There is no secret about it. It was the "try everything method"—that is, the process of exhaustion. I give an example which occurred to one of the other experimenters during my term of employment. Edison wanted very finely divided silver for use in place of graphite for electrodeposition during record manufacture. The chemist tried numerous methods of making finely divided silver and finally sent a report to Mr. Edison, who was ill at home for a few days, that silver as finely divided as Mr. Edison desired could not be made, that he had tried 40 methods without success.

I saw the report returned with this memorandum on it, "Keep on trying. There are 17 million chemical compounds you haven't tried yet." A few days later this experimenter was discharged and given just one hour to leave the premises.

However, the chief resentment of men working in the laboratory was the lack of public recognition which seemed to be their lot. They might have become reconciled to meager salaries had they been accorded due credit for important processes which, from time to time, they perfected. I hold no brief for them. Perhaps Mr. Edison deserved all the recognition—anyhow he got it.

The superintendent of disc record manufacture had a friend, a chemist Ph.D. from Yale, who desired a position with Mr. Edison. The latter spoke to him and then told him he could have work at $10 per week. The learned Doctor of Philosophy seemed stunned. Later Thomas A. asked the superintendent if his friend had accepted. The superintendent replied that he couldn't afford to accept.

"Never mind," smiled Mr. Edison. "Then he can't be worth a damn."

Mr. Edison disliked visitors at the laboratory. After seeing a number of visitors talk to him I understood his attitude. A good customer would be shown through the plant, and, of course, wanted to meet Mr. Edison. This was invariably the conversation:

"Why, Mr. Edison, you look just like your picture."

Mr. Edison would grunt.

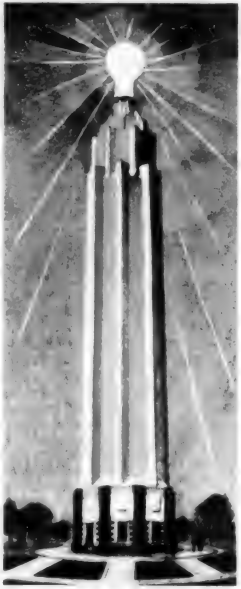
"Is it true, Mr. Edison, that you sleep only four hours per night?"

Mr. Edison would grunt again; then he would pick up a beaker or flask and shake it. The visitor would say, "I see that you are busy, Mr. Edison. Delighted to have met you. Good day, sir."

Once I was making a demonstration of a fire extinguishing fluid before Mr. Edison and other spectators. I had a miniature model and was trying to extinguish a coal fire aboard a warship. I drenched Mr. Edison and ruined his clothes. It wasn't intentional. He just got between me and the fire. Mr. Edison took it good naturedly and laughed with the spectators.

I found that Mr. Edison was constantly testing out his men. One morning he brought me an organic substance. "Berger," said he, "this is benzidine. I want you to make benzidine hydrochloride from it." I made a few tests of the substance and found that it had none of the properties of benzidine. I reported to him that the substance was not benzidine and gave the proofs. A little later I was given

[*Continued on page* 136]

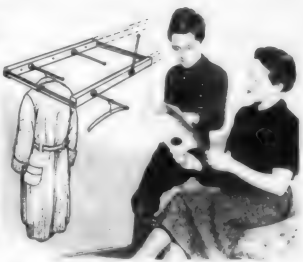


The Thomas Alva Edison Foundation will erect this monument on the site of the first Edison laboratory at Menlo Park. The design is by Massena & Du Pont, Wilmington architects. It will be 135 feet high and topped by a 15-foot bulb containing 960 incandescent lamps.

Eight-Year-Old Boy Obtains Clothes Rack Patent

RATED as one of the youngest inventors to whom a United States patent has ever been issued, Jordan B. Bierman, eight-year-old school boy of New Rochelle, N. Y., is inventor of a new type clothes rack. Jordan filed his application for a patent when he was seven and a half years old, but the patent was not granted until recently.

The young inventor devised a rack of special construction which provides for additional hanging facilities when a large number of garments are to be placed in an ordinary closet. Although a fourth grade student at Trinity School in New Rochelle, Jordan finds ample time to devote to his hobby of inventing and improving household aids.



Justifiably proud, Mrs. Harry C. Bierman of New Rochelle, N. Y., scans the patent issued to her eight-year-old son, Jordan, who invented a new type clothes rack as shown in sketch. Jordan is one of the youngest inventors ever to receive a U. S. patent.

Wheel Chair Is Powered

Designed to help invalids and aged persons get about, this electric powered wheel chair can attain 10 m.p.h. speed. Tires are puncture proof and low center of gravity prevents upsetting.

FEATURING a front wheel direct drive and tires that do not collapse when punctured, an electric powered wheel chair for invalids has been invented by J. E. Haschke, of Long Beach, Calif. The chair has a low center of gravity to prevent upsetting.

Two 15-plate auto starter batteries supply power for the chair's motor and a speed of 10 m.p.h. is attained. Three forward speeds and one reverse are provided by the motor.

Chain Saw Clamps To Tree

A SMALL power chain saw that can be clamped to a tree in cutting position has been invented by Albert Kankos, of Portland, Oregon. The power is provided by a gasoline or electric motor placed at one end of the machine.

The entire device weighs only 30 pounds and is claimed to be the lightest chain saw ever devised. By adding sections to the chain, the saw can be lengthened to cut any size timber encountered.

Invented by Albert Kankos, of Portland, Oregon, this compact power chain saw can be clamped to a tree in a few minutes. By adding sections of chain, timber of any size can be cut

Submarine Eye Scans Ocean Depths

A SUBMARINE eye for use in salvaging operations has been invented by Charles W. Heath of Sioux City, Iowa. The device consists of a photoelectric eye, suspended from a vessel, that picks up light waves cast on the ocean floor by its powerful bulbs and converts them into electrical waves transmitted to the vessel through cables.

Companion apparatus aboard the ship reconverts the waves into light waves and casts images on a screen through use of television principles. Mr. Heath's earlier inventions include a rear wheel suspension for motorcycles, an automatic locking auto gas tank, and an automatic calendar pad.

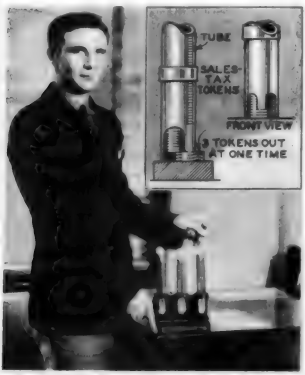
Ohio Man Patents Compact Body Air Conditioner

AN APPLIANCE designed to condition the air at the armpits to eliminate perspiration has been patented by Clarence L. Mumaugh, of Lima, Ohio. The appliance consists of two bulb-shaped pumps, one under each armpit, provided with flap valves through which antiseptics and other chemical conditioners can be inserted.

When arm pressure squeezes the bulbs, air, conditioned by the chemicals in the bulb, is forced out through valves, cooling the armpit. Cold virus killer can be inserted in the bulbs and inhaled through a long tube connected to the bulbs as a treatment for colds, if desired.

Clarence L. Mumaugh, inventor (circle), of Lima, Ohio, has patented a body air conditioning device sketched at right. Bulb-shaped pumps under armpits have flaps for insertion of chemicals. Air, conditioned by chemicals, is forced through valves by arm motion, as in skating, cooling armpit and eliminating perspiration. Device can be built into sporting pockets or other outdoor clothing.

Mill-A-Meter Helps Cashiers

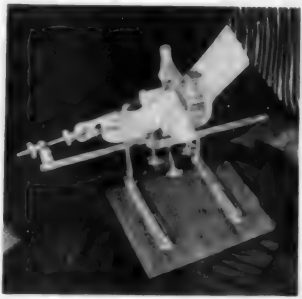


When many cities imposed a sales-tax, Malcolm Maris, of Tulsa, Okla., devised a mill-a-meter device to help busy cashiers change tokens. Tubes are set to release 1 to 3 tokens.

DESIGNED to help busy cashiers change sales-tax tokens, a mill-a-meter device has been invented by Malcolm Maris, of Tulsa, Okla. Simple in operation, the device is similar to the money changing gadgets used by car and bus conductors. Three tubes hold the tokens and are set to release one, two, or three tokens at a time.

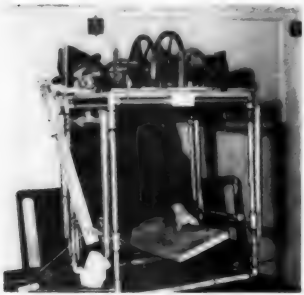
Device Aids Chiropodists

A DEVICE invented by Dr. Arthur F. Krausz, a Boston, Mass., chiropodist, can be used to stretch contracted calf muscles, to break up adhesions in joints of the feet, and for treating many other foot ailments. The apparatus is now in use at the Beth Israel Hospital in Boston.



Many foot ailments can be treated with this apparatus invented by Dr. Arthur F. Krausz, a Boston, Mass., chiropodist. Device stretches contracted muscles, breaks joint adhesions.

Machine May Harness Energy Of Ocean Waves



A. B. Snider, of Portland, Ore., demonstrates model of his invention designed to produce electricity by harnessing energy in ocean waves. Float, agitated by hand to represent ocean waves, transmits motion to electric generating machinery.

A WORKING model of an invention designed to harness the latent power of pounding ocean surf has been completed by A. B. Snider, of Portland, Oregon. With the model, Snider produced enough electricity to illuminate a tiny flashlight bulb.

In a full-sized ocean wave dynamo, as the invention is called, a six-ton float would suspend from the center of a steel structure anchored in the surf at a point insuring maximum wave agitation of the float. Cables, running from the float to electric producing machinery atop the structure, would utilize every reaction of the float to the surging water, causing electricity to be generated at every movement of the float. Low cost electricity is the goal set by the inventor.

Auto Freight Powers Boat

A NOVEL boat, now in operation on the Thames in London, is powered and steered by the auto freight it carries. An automobile is driven aboard and both axles are raised with jacks installed in bottom of boat. Special pads grip outside edges of the revolving wheels of the auto and by means of a worm-shaft and worm-wheel actuate the boat's twin propellers.

The boat is steered by steering wheel of the auto, the front wheels being connected to rods in boat that apply brake to one rear wheel according to direction of turn, stopping propeller on that side. The craft was developed by Burgess Engineering Works, of London.

Constructed of welded steel plates, this novel boat features mechanical arrangement by which it is powered and steered by auto it carries. Auto can be adjusted on boat in 10 minutes.

Mop Has Disposable Roll

Equipped with crepe wadding roll, this dust mop makes it easy for housewife to remove soiled dusting surface and replace it with fresh one. Roll is easily inserted in special holder.

A DUST mop that uses disposable dusting material has been developed by a Chicago, Ill., manufacturer. The mop features a roll of crepe wadding which is claimed to be superior to paper or cloth. As the outside layer becomes soiled, it can be torn off and a new layer made ready for use. Rolls are inserted in a special holder.

Dixie Dugan's Fathers

JOHN STRIEBEL

Cartoons reproduced through courtesy of McNaught Syndicate

J. P. McEVOY
(Portrait by James Montgomery Flagg)

One of the first to apply the partnership principle to the creation of a cartoon feature, the team of John Striebel, artist, and J. P. McEvoy, writer, produced the famous cartoon character, Dixie Dugan. The exciting adventures of Dixie, her family, and pal, Mickey, have made the strip popular.

A MAN is never too young to become a cartoonist.

John Striebel, who draws the widely popular "Dixie Dugan" cartoon strip, won national prominence at the age of fourteen when he was recognized as the youngest front-page cartoonist in the country. He was staff artist for the South Bend, Indiana, *Daily News*, doing a daily current event cartoon on topics of political and local prominence.

During those days young Striebel was a freshman at Notre Dame University in South Bend, and he turned to cartooning as the most congenial means of earning his way through college. Other students faced the same problem, and one day a fellow Notre Dame freshman came into the newspaper office in search of a job. He was a 15-year-old youngster who was promptly hired as an office boy. The two freshmen immediately became fast friends, and out of this early association sprang a partnership which has exerted a powerful influence on comic strip art.

The other freshman was J. P. McEvoy—an office boy who graduated to newspaper columnist, syndicate writer, Hollywood scenarist, and contributor to national magazines where his work soon established him as one of the nation's best known and best paid humorists.

The team of Striebel and McEvoy was one of the first to apply the partnership principle to the creation of a cartoon feature, and the success of their collaboration has helped to establish the human interest type of comic strip in the race for public popularity.

Today the "gag" type of syndicated strip is fast passing out of the picture, finding its specialized field in the single-frame drawing which is not, strictly speaking, a "strip." It is no longer strictly accurate to describe newspaper cartoon strips as "funnies" or "comic strips." To replace the gag strip

[*Continued on page* 143]

CONQUERING the

by Stuart Whitehouse

SOME million years ago, Nature built a dam in Central Washington at the same place that the government today is constructing its greatest electrical project, the Grand Coulee Dam, at a cost of $168,000,000.

The difference is that Nature's dam was glacial ice, while the government's is of concrete. In principle and in effect, they are identical. The topography of Washington must be understood before the idea back of the Grand Coulee Dam can be explained. It is a landscape carved for modern needs back in the glacial ages.

At that time, the Columbia River followed a winding course along its present bed. Then an immense glacial dam, nearly a mile in height, moved down across the river, and diverted its course directly south. During

A fairyland of lights. Night operations at night on the Grand Coulee dam. This view from the west abutment shows a block of concrete of more than one million cubic yards in the west excavation. Lights on suspension bridge and up canyon will mark the great belt conveyor. Bedrock of west excavation is shown at right. Concrete is being poured from high trestles. Bureau of Reclamation Photos.

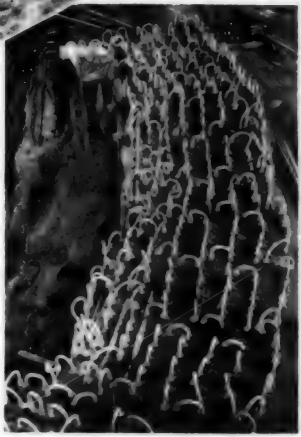
Engineers Build First Structure Bigger Than Great Pyramid To Turn Mighty Columbia and Make Vast Northwest Farm Area Bloom Anew.

GRAND COULEE

the thousands of years of this "temporary" diversion, the river dug itself a new channel, two to five miles wide and 600 to 800 feet deep, cutting down through layer after layer of volcanic rock.

Then, at the end of the ice age, the great ice dam melted, and the river went back into its own channel. The second channel remains as an immense dry gully, the Grand Coulee, 52 miles long.

This unique dam of frozen earth stopped a slide of 200,000 cubic yards last fall in the east excavation of Grand Coulee dam. Engineers designed the strange structure as an emergency measure to permit the contractor to maintain his schedule.



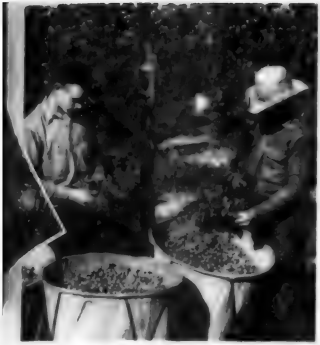
A closeup view of the frozen earth dam. Two refrigeration machines of a total capacity of 80 tons of ice a day chilled brine which circulated through six miles of pipe to freeze this dam. 25 feet thick, 105 feet long, and 40 feet high.

The theory of the Grand Coulee dam is to build a dam across the Columbia, raise the water so that it is diverted into the Grand Coulee, which in turn will carry the water into the vast Columbia basin area, now 1,200,000 acres of dry, but potentially fertile land.

This desert, experiments have shown, is capable of growing the finest fruits and vegetables when it is irrigated.

A second and equally important part of the Coulee project is the nation's largest power plant, with a capacity of 2,500,000 horsepower.

The construction of this world's largest piece of masonry has been under way since September, 1934, and the first contract, calling for the base of the dam, approximately 250



With irrigation, Columbia basin lands prove highly productive. This is a scene during the hop picking season on an irrigated ranch in that section of the Northwest.

550 feet high, 500 feet thick at the base and 36 feet thick at the top.

The total cost, including the power plant, will be $168,000,000.

Contractors for the dam are Mason-Walsh-Atkinson-Kier, four nationally-known builders. During the past year, Silas Mason, who held the largest part of the contract, died suddenly. Thomas Walsh is a mid-western builder. The Atkinson company is prominent in West Coast building. The Kier Bros., of San Diego, have been contractors on many western dams and buildings. At the Coulee site, the Kier interests have been largely responsible for the building and maintenance of Mason City, the company town.

First engineering problem was the removal of 10,000,000 cubic feet of dirt from the west side of the dam, in order to reach granite bedrock.

Abandoned because of the drought, this forlorn farmhouse stands as an example of the need for irrigation. It was built by a dry land farmer who planted an orchard during a series of abnormally wet years two decades ago.

feet high, will have been completed by February of 1938, engineers estimate.

From then on it will be a simple engineering feat of pouring more concrete, on block after block of the dam, until it is completed.

It will be the only piece of masonry in the world larger than the Great Pyramid of Gizeh, being 4,300 feet long across the river,

Loosening the dirt was simple, but getting rid of it was not. The solution was a conveyor belt, a mile and a quarter long, which carried the dirt and gravel into nearby Rattlesnake canon and dumped it. The principal conveyor belt, five feet wide, was fed by a series of smaller belts which were moved from place to place within the excavation.

At top speed, the conveyor dumped a ton and a third of dirt and loose rock onto the dump pile every second! So successful was this conveyor system in speeding the work, that a smaller system is now being used in bringing sand and gravel to the dam, as will be told later.

Just as a dentist scrapes a tooth before putting in a filling, so the contractors removed the ten million tons of loose dirt and rock on the west side of the dam and then scraped and cleaned the bedrock. The work was carried on behind an immense curved cofferdam, which kept the river from encroaching when the excavation dropped below water level. Then came the problem of pouring the concrete. Or rather, the problem of mixing the cement and sand and gravel fast enough for the needs of the contractors.

The big thing was to get the materials to the dam. The cement, the product of five different cement factories, is brought to the Coulee in the wilderness over 20 miles of government-built railroad. Then it is put into immense silos on top of the surrounding hills above the river. From there the dry cement is blown by huge blowers for a mile through a pipe line to the mixing houses, one on each side of the river.

The gravel pit is two and a half miles back in the hills. There, four kinds of gravel are graded and put on another conveyor belt, which rumbles day and night carrying materials for the dam to the mixing houses. One branch of the conveyor carries the gravel to the east side mixing house, the other

The Grand Coulee which gives its name to the mighty dam being constructed near its head in the Columbia River by the Bureau of Reclamation. The coulee will be used as a reservoir in the irrigation of the Columbia Basin.

Two cities have come into being to house the 5,000 Grand Coulee Dam workers and their families. In the foreground below is the permanent government city, Coulee Dam, which will house dam and powerhouse attendants. Across the river lies Mason City, the contractor's camp. This is entirely electrified and has no chimneys.

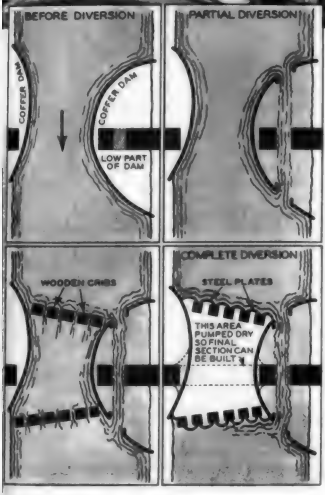


Diagram and photograph show how the Columbia was diverted to flow through four sluice left in the west section of the dam. The downstream cross river coffer-dam, seen at the left in the photograph, has been closed, and the upstream coffer-dam at the right is approaching completion.

branch crosses the river, high overhead, and delivers its burden to the west side mixing house.

There are four sizes of gravel used, varying from just larger than sand up to rocks almost the size of a man's head. In addition, three varieties of sand go into the formula for the dam's concrete—a formula worked out by government scientists as especially suited to the job at hand.

The two mixing houses are veritable houses of magic. A man presses a button, and so many tons of sand go into the revolving hoppers; another button is pushed and the right proportions of cement are added. This mixing is closely supervised by government inspectors, as the strength of the dam is measured by the strength of its concrete.

The dam is being built up in huge blocks, much as a child builds a wall of blocks. The chemical action of concrete causes it to heat to a temperature of 120 degrees Fahrenheit. Without chilling, the dam would retain this

Draglines and pile drivers at work on the cross-river coffer-dams make the Grand Coulee dam site a scene of great activity even in mid-winter. As the picture was made preparations were being made to divert the water from this central section. The map indicates the dam site and the area to be irrigated in relation to Spokane and other State of Washington points

warmth for half a century. Therefore, several miles of pipe is built into the dam, honeycombing it. Cold water from the river will be pumped through these pipes until the concrete is properly chilled, then concrete will be pumped into the pipes.

The west half of the dam is well under way. For more than a year, concrete has been steadily poured to form the blocks which have risen now to more than 50 feet above the water level in some places. Forty carloads of cement have been used each day in this colossal task.

Four of the huge blocks have been left below the water level for the time being. A portion of the coffer-dam has been removed and the water has been diverted over the completed portion.

Two lines of wooden cribs, each crib 40 feet long, have been loaded with rocks and sunk in the river to dam off the central portion of the river bed to divert the water over the present partially completed portion of the dam. Between these two crib-dams, the water has been pumped out and in February workmen were removing shale

[*Continued on page 157*]

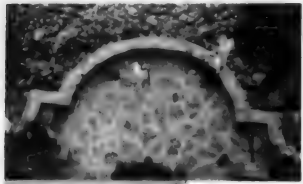
Plastic Material Transmits Light Around Bends

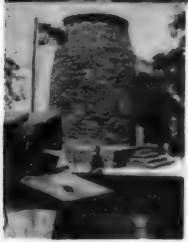
A UNIQUE quality of a new plastic developed by du Pont research chemists, is its ability to transmit light around bends. It is impervious to alcohol, alkali and acids and can be cut, drilled, sawed, and polished.

Demonstrating the plastic before the New York Electrical Society, Harold Payne, lecturer, placed curved tubes and sheets of the material over a box containing illuminated electric bulbs. The light was seen to travel through the material, appearing only at the end of the tubes and along the curved edge of the sheet. The crystal clear plastic is unaffected by sunlight and its freedom from color permits dye fabrication into sheets of varying degrees of color.

Before members of New York Electrical Society, Harold Payne, lecturer, demonstrated light bending quality of new du Pont plastic. Light from bulbs in box on table passed through curved tubes and sheet, appearing only at ends.

Washington Tower Rebuilt





Believed to be the first Washington monument, the blue stone shaft shown at left was crumbling to ruin when members of the Civilian Conservation Corps preserved it for posterity by rebuilding it of permanent masonry. Standing atop Blue Ridge mountains near Boonsboro, Md., the monument was originally erected in 1827. Effect of time and elements made rebuilding necessary in 1882. Upper photo shows view from observation platform on top of 50-foot tower.

A 50-FOOT tower of blue stone, said to be the earliest monument erected in honor of George Washington, has been rebuilt in permanent masonry by CCC workers. The monument is atop a spur of the Blue Ridge mountains near Boonsboro, Maryland and was originally erected by citizens of Boonsboro and neighboring towns in 1827.

Builds Business From Hobby

TURNING a hobby to profitable use, Evelyn Collins, 15, of Lansing, Mich., has set up a workshop in the basement of her home in which she produces pottery to sell to local stores. Evelyn learned modeling through a club organized at West Junior High School in Lansing.

There are few tools in the basement workshop, most of the work being done by molding the wet clay with the fingers as it revolves on a potter's wheel. Many neighbors purchase the pottery to be used as bridge game prizes and their praise of the young artisans' products has resulted in additional orders.

Started as a hobby, a pottery business has been developed by Evelyn Collins, 15, of Lansing, Mich. Molding beautiful objects from spinning wet clay, Evelyn sells creations to stores.

SEVERSKY, Flying Inventor

Major Alexander P. de Seversky (circle) is not only a noted speed pilot, but designer and builder of some of the fastest all-metal military airplanes in the world. A group of his famous planes is shown above. Left to right—the SEV-3, amphibian monoplane with retractable wheels in pontoons; SEV-3XAR, two-seater training plane; P-35 single-seater pursuit, and a two-seater pursuit trainer, convertible to speedy single-seat fighter.

by Aubrey D. McFadyen

PROPELLER ticking over idly, a sleek all-metal amphibian plane jockeyed the swell of the East River current before a seaplane base located at a pier in lower Manhattan. Suddenly, with a blaring of sirens from a motorcycle escort, a limousine drove onto the pier and New York City's mayor, Fiorello H. La Guardia, emerged from the car before its wheels had stopped turning.

A few minutes later, the mayor was seated in the cockpit of the amphibian behind the husky figure of Major Alexander P. de Seversky, pilot of the plane, and with a roar from the already warmed engine, the craft tore down the river, bounced on the waves a few times and streaked away into the sky.

One hour later, after actual flying time of 45 minutes, Mayor La Guardia was addressing a congressional committee at the capitol on the desirability of converting Governors Island in New York harbor into a commercial airport so that business men using the air lines would lose little time in traveling from the airport to the business center of the world's greatest metropolis.

To Major de Seversky, the flight was just another speed dash, a practical application of speedy air travel. His mania for speedy aircraft received world recognition when, during an air meet held at Detroit, Mich., thousands of eyes were attracted by a sleek, all-metal amphibian as it rocketed across the sky in a thunderous burst of speed. On the ground officials bent over the timing apparatus and another world's record went into the books as they clocked the streaking amphibian at 230.4 m.p.h.—40 miles an hour faster than the previous record.

In the cockpit of the trim craft, its designer and builder—the famous one-legged aeronaut and inventor, Major de Seversky—felt that establishing a new speed record for amphibians was just a progressive incident in his career, already filled and brimming over with adventures and famed accomplishments.

Alexander P. de Seversky was born at Tiflis, Russia in 1894. He was educated at the Imperial Naval Academy, graduating as a lieutenant of the Imperial Russian Navy. As an officer his keen interest in aviation led to assignment to the Imperial Military School of Aeronautics, as well as to numerous post-graduate courses in aeronautical engineering. Seversky was thus trained in all branches of

[*Continued on page* 118]

Inventor Perfects Foolproof Lifeboat Launching Unit

BECAUSE of the appalling number of lives lost at sea through the inefficiency of some lifeboats, which either capsize when they hit the water, or are useless because they cannot be launched from a slanting deck, J. L. Hyland, of New York City, has developed what is considered a foolproof launching unit.

While many have worked on this problem with considerable success in the past few years, Mr. Hyland has perfected his lifeboat and launching unit only after 30 years' work, and shipping men consider the Hyland system to be satisfactory.

The Hyland invention consists of an apparatus that holds the lifeboats close to the deck, preventing them from swinging out beyond reach when the liner lists, or keeping the boats from being smashed against the higher side of the vessel. The launching unit can be moved by one man from its stored position inboard, loaded and launched in one-twentieth of the time it now takes, it is claimed.

J. L. Hyland, of New York City, launching his lifeboat unit from the low side of a listing ship to show how apparatus holds lifeboats snugly to the deck to prevent smashing.

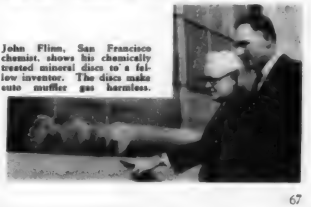
Tire Changer Aids Women

This simple dolly makes it simple for women driver to change tires.

A TIRE dolly, equipped with small wheels and which can be handled with one hand, has been invented and patented by Hugh H. York, of Phoenix, Arizona, and is proving a boon to women drivers. All cars now carry spare wheels instead of spare tires, but they have proven too heavy for a woman to lift and change without assistance in case of a blowout on the road. With Mr. York's device the heavy wheel is placed on the dolly, rolled into position, and easily lifted onto the axles. The dolly is designed so one end can be used to unscrew wheel bolts when tires are changed.

Deadly Gas Made Harmless

A CHEMICALLY treated mineral, which is cast into discs to fit into the ordinary automobile muffler, may eliminate death from carbon monoxide, one of the deadliest gasses known. The discovery of John Flinn, San Francisco chemist, makes the exhaust gasses passing around the chemically treated discs harmless to human beings. Tests with a motor bus equipped with the non-monoxide muffler showed that the discs eliminated the monoxide to a minimum. The bus, which delivered 6.3 per cent of monoxide normally, produced only three-tenths of one per cent when equipped with the Flinn device. As little as one per cent can cause headache, and three per cent causes unconsciousness. Deaths from this gas increased 400 per cent since 1924. The California Legislature is considering a law compelling all municipally-operated vehicles to use the muffler.



John Flinn, San Francisco chemist, shows his chemically treated mineral discs to a fellow inventor. The discs make auto muffler gas harmless.

Magic-Makers

Sound engineers combine ingenuity and science to make up their bag of tricks.

To provide sound illusion of auto crash, Walter Pierson, CBS engineer, combines two recordings of speeding autos to create a crash effect on third record at exact moment called for in the script.

Microphone registers roar of fast train when this heavy iron disc is revolved by Al Van Brakle, sound technician. Roller skate wheels beneath disc produce clickety-clack effect of racing train.

THEY were dissecting the brain of Nicolai Lenin—on the radio.

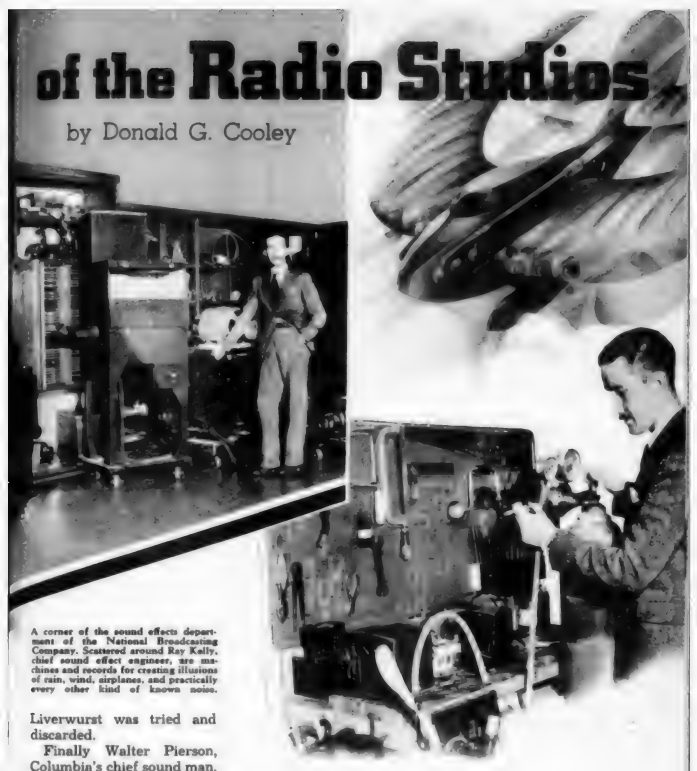
It was a news broadcast of the achievement of the Soviet Brain Institute in Moscow which had developed a means of slicing brain tissue into thousands of paper-thin fragments for scientific study.

"Give us the sound of a brain being sliced," came the bizarre order to the sound effects department of the Columbia Broadcasting System.

The broadcast—it was on the "March of Time" program—was to go on the air within a few hours. Columbia's sound experts hurriedly experimented with meat sliced before the microphone. It was unsatisfactory. Someone suggested cheese, but this also failed to fulfill the delicate assignment.

of the Radio Studios

by Donald G. Cooley



A corner of the sound effects department of the National Broadcasting Company. Scattered around Ray Kelly, chief sound effect engineer, are machines and records for creating illusions of rain, wind, airplanes, and practically every other kind of known noise.

Never heard on land or sea until created by radio, the sound effect of steam airplane engine of the future was produced by Ray Kelly, NBC engineer, by hooking small motor and wooden propeller to compressed air tank.

Liverwurst was tried and discarded.

Finally Walter Pierson, Columbia's chief sound man, smiled with satisfaction. He had it! The broadcast was given on schedule. The "brain" of Nicolai Lenin, sliced within an inch of the microphone with a realism that satisfied several million listeners, was a slightly over-ripe banana!

This is but one incident, selected from hundreds that complicate the inventive lives of the sound experts, which serves notice on the radio fan that he must be prepared to discard all preconceived notions of how sound effects are produced. For during the last few months the art of the sound effects man has changed so drastically that the chances are whatever you have read about his unique business is obsolete.

Today the sound man has become the scene-setter of radio. The movies long ago discarded the painted canvas background for the elaborately constructed set. Just so, the

Pistol shots and marching soldiers enliven war story as produced by these sound experts of Columbia Broadcasting System. Loosely mounted wooden blocks within frame produce effect of thousands of marching men when brought in contact with sounding board. Sound man at left awaits cue to fire pistol into "shot box." Right—Depicting grounding of passenger liner on reef, Jimmy Rinaldi manipulates drum device containing pebbles while Ora Nichols taps out SOS signal on wireless key in the background.

modern radio sound effect is a composite thing designed to create a visual image. The days when a few phonograph records, a thunder machine, and a door for slamming purposes constituted the sound equipment of a studio definitely belong to radio's youthful past.

"A single sound effect no longer gives the desired mental image," says expert Pierson of Columbia. "Sound, like the scenery of a stage play, must give a three-dimensional effect. For instance, the ticking of a clock gives an isolated bit of atmosphere. But add to the ticking the sound of an opening window, plus the distant ringing of church chimes, and you have an entirely different mental picture—one with action, depth, a background for drama."

The new methods by which the network broadcasters produce their effects are fascinating. Ray Kelly, head of the National Broadcasting Company's sound effects department, has invented hundreds of devices for this purpose. His latest creation is a new thunder machine which can't even be heard in the studio!

It is an ordinary window screen mounted in a frame, with electric wires connected to the mesh and passing through a switch to the microphone. When Kelly strikes the screen with a soft mallet, the sound is inaudible a few feet away, but the microphone picks it up, intensifies its lowest vibrations into the roll of thunder that is stormy weather at its worst.

Part of the vast equipment used by the NBC sound effects department for producing all types of sounds on the air is shown at the right. In background are automobile doors, French windows, screen doors, prison doors, etc. In foreground are machines for producing communication sounds, sounds of Model T Ford, a portable sink for running water, and loud-speaker units for playing records featuring many other "canned" sounds.

The sound effects man has to know the possibilities of the microphone—its ability, for instance, to broadcast inaudible sounds by picking up certain vibrations which can be intensified in the control room. He also must have a retentive ear and more than an average allotment of mechanical imagination. The ideal sound effects man has been described as one who, honked at by a taxi in the street, registers the sound of the horn before he jumps.

All too often the expert does not even have the advantage of hearing or analyzing the sound he is called upon to reproduce. A surprising number of radio effects are sounds never before heard by mortal man. One of Kelly's assignments was to produce the sound of an, as yet, uninvented steam airplane motor on a program presenting scientific advances of the future. With a length of rubber hose, he hooked a container of compressed air to a model airplane propeller and the sound effect was perfect.

A similar assignment came the way of Walter Pierson of Columbia. In the "Cavalcade of America" program the script called for a reenactment of the run of the original locomotive of the New York and Hudson railroad which ran 25 miles up the Hudson river and then blew up. He read descriptions of the catastrophe, and used a heavy iron disc running on wheels like a merry-go-round to recreate the clatter of the suicidal engine.

Not all sound effects require ingenious mechanical devices. In the enactment of a news broadcast describing a blood transfusion operation, the sound of dripping blood was required. Water was tried and found too thin. Clam broth fell short of requirements. Tomato juice was the substance finally used.

[*Continued on page 126*]

Sound effect of a busy factory is created by whirling large gears, shown above, before microphone. At right, Ray Kelly shows how his new invention produces sound of thunder. Window screen is struck with tympani hammer and lowest vibrations, inaudible in studio, are amplified for the microphone. The sound is regulated by the switch Kelly adjusts with his left hand.

Transparent Visualizer Helps Tailor Sell Suits

Placing a bolt of selected material behind this outline of a well tailored man, Lee Levering, a Tulsa, Okla., tailor, shows customers how suit will appear when finished.

A NOVEL device for merchandising tailored suits has been developed by Lee Levering, a custom tailor in Tulsa, Oklahoma. The device, known as a visualizer, enables both the purchaser of a suit and the tailor to obtain a visual impression of how the finished suit, selected from bolt-goods, will look.

The visualizer consists of a transparent outline of a man mounted in a frame on which heavy lines indicating the style of the proposed suit are also featured. By placing a sample of the bolt-goods against the rear of the frame, the front effect is that of a man neatly attired in a suit of the selected material.

Petrified Service Station

FORTY-FIVE tons of petrified wood were used in building a unique service station in Lamar, Colorado. The wood is so perfectly preserved by the silicon which turned it into stone that only by touching it with his hands can an observer be convinced he is not looking at ordinary logs.

The petrified logs were obtained from an extensive deposit near the city and geologists estimate the age of the logs at 200 million years. Unable to estimate the amount of strain that could be withstood by the logs, the builders placed all logs in a vertical position around a steel and concrete inner building.

Built and owned by Brown Lumber Co., of Lamar, Colo., this Phillips Petroleum Co. service station features an outer wall of petrified logs believed to be 200 million years old.

Device Aids Weather Study

Flying to 17,000 feet daily, William Bowerman, Miami, Fla., Airport weather bureau pilot, seeks data for weather maps. Robert Smuck, mechanic, discusses instrument data with Bowerman.

INSTALLED on the wing of an airplane out of reach of the propeller blast, an aerometeorograph is used by the Miami, Fla., airport weather bureau to record temperatures, pressure and humidity at heights up to 17,000 feet for daily weather map data. Tests are made in morning between three and four o'clock and it takes pilot one hour and twenty minutes to reach maximum height.

Canadian Builds Model Of Famous London Bridge

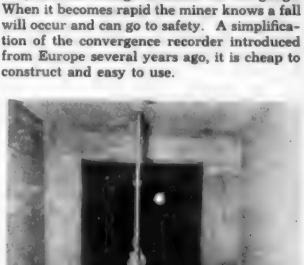
HIS ambition to be an architect frustrated when he was forced to go to work in a Lancashire, England, cotton mill at the age of 13, Edgar A. Gill of Vancouver, British Columbia, turned to a hobby, and the result is a work of art so outstanding it won the praise of the Lord Mayor of London recently.

Without training, Gill built a model of the famous Tower Bridge of London, to an exact scale of one-sixteenth of the original from blueprints and photos supplied by members of the Guildhall, London. The work required five years and over $200. Seven different types of wood were used, and the automatic drawbridge lowers and raises electrically. The traffic chains, placed when the bridge is up, are of nine karat gold. Silver and gold are used in the coat-of-arms set against the coping of two overhead footways. The span is illuminated by 24 tiny electric lights wired in parallel, just as the real bridge is lit above the dark waters of the Thames.

To make this model of London Bridge exact, its builder, Edgar A. Gill, of Vancouver, scrapped a whole year's work to correct single error. Span required five years to complete.

Gauge Warns Of Mine Slides

A GAUGE to warn coal miners of impending rock falls has been developed at Pennsylvania State College. The device consists of two telescoping tubes pressed against the roof and floor of a mine by a coil spring. If the floor upheaves or the roof subsides, the upper tube slides into the lower one, and the change is shown on the gauge. When it becomes rapid the miner knows a fall will occur and can go to safety. A simplification of the convergence recorder introduced from Europe several years ago, it is cheap to construct and easy to use.

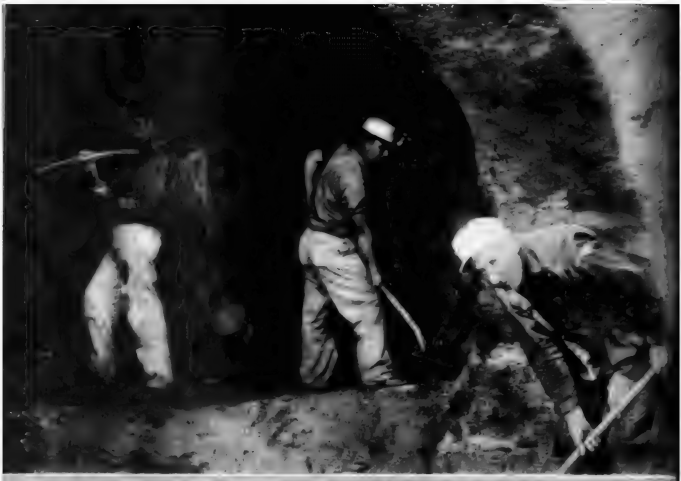


Dr. Helmut Landsberg, geophysics instructor at the Pennsylvania State College, demonstrates convergor gauge that will warn miners of impending rock slides. Telescopic tubes press against roof and floor of mine, slightest upheaval being registered on tube gauges.

Windmill From Oil Drums

Four halves of two oil drums form this efficient windmill on a farm in South Dakota.

EMPTY oil drums have been utilized for many purposes, but it took a clever South Dakota farmer to use one for a windmill. Two drums of equal size were cut in two, and the four halves braced and mounted on a rack. A discarded Model T differential and drive shaft completed the arrangement, which was coupled to an automatic pump from a point on the old auto wheel. Very little wind is required to operate the pump. The breeze catches in the open drums and pushes them around, actuating the pump.



Federal and state governments are co-operating in efforts to check the ravages of the 53-year-old mine fire that has been devouring coal fields near towns of Shawnee and New Straitsville in the hills of Perry County, Ohio. Nearby are the Hocking Valley mines that supply one-tenth of the nation's coal. WPA workers are shown working in a tunnel that has been cut through a seam of coal in an effort to isolate the region in which the fire rages. To prevent fire from jumping across tunnel, holes have been bored from the surface through which a stream of sand has been pumped to fill tunnel.

W.P.A. BATTLES

by C. A. Robinson

FEDERAL and state governments have joined hands to check the ravages of the world's greatest mine fire in the hills of Perry County, near Shawnee and New Straitsville, Ohio. Works Progress Administration workers under the direction of A. J. Laverty, chief operations engineer, are making great strides in their fight to extinguish the flames which have burned continuously and furiously since 1884, destroying more than $50,000,000 worth of high grade coal.

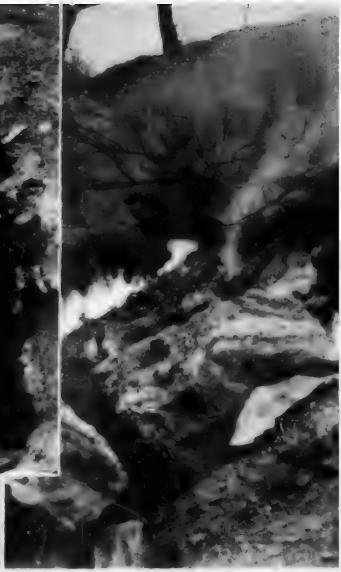
The fire fighters are taking a lesson from the pioneers who plowed furrows in the path of sweeping prairie fires and, with giant steam shovels, dynamite, and manual swinging of picks and shovels, are digging up the coal veins that the blaze would follow in its natural course. The chief objective is to isolate the combustible material and let the fire burn itself out.

The great Hocking Valley coal fields are in the path of the flames and although many previous efforts have been made to stop the fire, the present $365,000 project is being anxiously watched by coal operators and business men who, curiously enough, only in recent years have begun to realize how much the ultimate loss might be if the Hocking Valley menace is not destroyed.

The story of how the fire was started is a strange one. In 1884 the first units of a miner's union was organized in the state and one of the most bitter labor struggles in American history ensued. A strike was called and when it had been in progress for six months reached the danger point.

One night, a group of miners seized a number of loaded mine cars on a tipple at

Twenty-four hours before above photo was taken men were working this mine. Although surrounded by blazing hills and crevices, many of the mines are still worked. Miners feel walls, fleeing when heat reaches danger point. Right—Intense subterranean heat caused this hill to collapse and slide into valley.



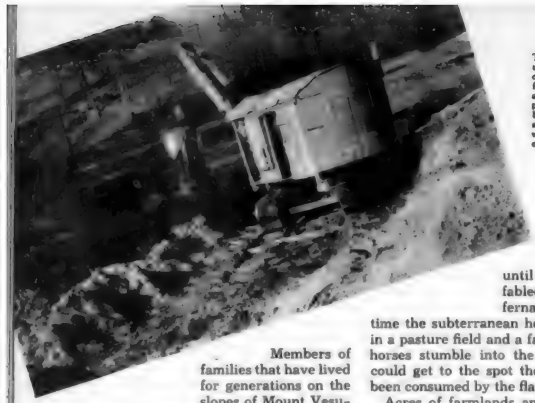
53-Year Old FIRE

New Straitsville, poured oil on them, ignited it, and ran the blazing cars into five different shafts a mile or so underground. Within twenty-four hours the workings near the town were honeycombed with fire, and before a week had passed, the creeping flames were beyond control. A number of ventilation channels necessary in mining work reached down into the hill where the torch cars had been left and acted as smoke stacks, providing a draft to fan the spreading flames.

Year after year, the fire expanded constantly eating its way into new territory. It not only swept through corridors, tunnels and drifts where mining operations had been carried on, but burned into solid seams through which gases and fumes had opened fissures. Consequently, no one knows where the fire is likely to break the surface and, because of this, many strange things have happened.

Not long ago a resident of the valley discovered that his cistern water supply had gone dry. Before he had ti to figure out the reason, the cistern began to emit smoke, the terra cotta casing that projected above the ground began to crack from the heat and the home owner decided he had better move. The house was salvaged, but the cistern continued to send out smoke as if it were a chimney.

In a number of places throughout the area mines are still in operation, and regularly the miners feel the walls of the tunnels in which they are working to determine how hot they are. From experience, they have learned to know the danger heat point, and out they go with their tools, hurriedly pulling up the track as they retreat.



This steam shovel is being used to change course of creek so that a coal vein, ten feet thick, can be uncovered and removed to eliminate possibility of fire crossing beneath the creek bed. Steam shovels, dynamite, and men with picks and shovels carry on the fire fighting work.

Members of families that have lived for generations on the slopes of Mount Vesuvius become accustomed to dwelling on the crust of a volcano and give little thought to the molten rocks, steam and gases not far below. So it is with the residents of the Hocking Valley.

In rainy or foggy weather fumes from smoldering mines creep under their door sills. Every night there are hillsides illuminated until they resemble the fabled entrance to the infernal regions. At one time the subterranean heat opened a crevice in a pasture field and a farmer saw one of his horses stumble into the chasm. Before he could get to the spot the animal's body had been consumed by the flames.

Acres of farmlands and woods have been ruined, several homes have been hurriedly abandoned, a church and a school house have been threatened and sections of paved highway have caved in, but still the fire goes on. In a number of places, a few yards from spots where smoke and fumes are escaping from fissures, oil and gas wells are in operation.

[*Continued on page 132*]

Hanlon Hill, near New Straitsville, Ohio, is a devastated area of 40 acres of bottomless holes emitting smoke, fumes and gases. Strange to behold, oil derricks are at work nearby. Underground casings prevent ignition of oil.

Air University Teaches Young British Pilots

IN THE same manner that Great Britain trains her youth to "go down to the sea in ships," a school has been established at Southampton to teach the new generation to "go up in the air in flying boats."

With the great expansion of air lines between England and her colonies, and the increasing number of planes being put into service, Imperial Airways, Ltd., is training young pilots in every technique, including the use of navigation instruments and radio receiving and sending units. The pilots thus begin their flying careers with a good understanding of technical details even before they get into the air.

Besides building up one of the best trained civil air corps in the world, the youths will also be qualified as reserve officers in the Royal Air Force.

Part of a class of 100 young pilots tapping out and receiving radio messages at air university of British Imperial Airways in preparation for positions piloting huge flying boats.

Philip Pawlowski keeps watch on the lobby of Cook County Jail in Chicago from his revolving seat in five-windowed machine-gun cage facing exit to street and entrance to cells.

Famous Jail Escape-proof

DESPERADOS in the Cook County jail in Chicago, where many of the nation's most notorious gangsters found temporary lodging during the bootleg era, now find the famous bastille much like a little Alcatraz. New bullet-proof cages, manned by guards equipped with machine guns and tear gas rifles command all entrances and exits, making the jail a model fortress.

In the lobby of the jail a guard sits on a revolving seat in the five-windowed machine gun cage, facing the exit to the street and the entrance to the cells. Behind his bullet-proof glass he is able to watch every movement of the inmates.

Camera Spots Spoiled Soil

A LADDER mounted on a light truck is being used with success in obtaining pictures of soil conservation progress. Pictures taken from a height show features of soil conservation work to the best advantage, as trivial foreground details are eliminated and the camera's range is extended to depict activity over a large field or even an entire farm, and spotting of areas needing attention by conservation workers is facilitated.

This collapsible ladder makes it possible for a photographer to secure pictures from height of 25 feet. Mounted permanently on truck, it is braced with cables hooked to front and rear and can be set up quickly.

Tiny Magnet Produces Highest Permanent Field

Dr. Francis Bitter, of Massachusetts Institute of Technology, adjusts compact magnet he developed to produce highest permanent magnetic field ever attained. Huge bus bars carry current and pipes supply water to keep magnet from melting.

EIGHT inches long and six inches in diameter, a magnet developed at the Massachusetts Institute of Technology in Cambridge by Dr. Francis Bitter, of the department of mining and metallurgy, is capable of producing the highest permanent magnetic field ever attained. Its rated intensity is 150,000 times greater than the earth's magnetic field.

The magnet is housed in a bronze shell through which water is circulated to dissipate the enormous heat generated by a power load equal to the electric requirements of a small town. Power was made available for experiments with the magnet through co-operation of Edison Electric Illuminating Co., of Boston. The instrument will be used for studies of the effect of intense magnetic fields on various classes of matter.

Auto Built Like Airplane

POWERED by a six-cylinder motor featuring dual carburetion, consisting of one up-draft and one down-draft carburetor, a novel airplane-type auto has been developed by Len L. Seiler, of Boone, Iowa. The motor operates on the up-draft carburetor until a speed of 50 m.p.h. is reached when the down-draft carburetor automatically cuts in.

The car has a body of 22-gauge rustless steel riveted to a welded steel frame with duraluminum rivets. The instrument board features airplane instruments, throttles, and choke. Two seats are arranged in tandem.

Len L. Seiler, of Boone, Iowa, spent 21 months building this novel auto. Car features airplane construction and has steel body attached to welded frame with duraluminum rivets.

Develops Auto Air Engine

Visualizing autos powered with compressed air motors, Charles Hunt, Springfield, Mo., inventor, built this model motor to prove theories. Tank at right stores compressed air supply.

ACTUATED by the rocking and swinging of a moving auto, pumps attached to the auto's shock absorbers compress air in tanks and supply power for turning crankshaft of a model automobile engine developed by Charles Hunt, 67-year-old inventor of Springfield, Mo. Two reserve air tanks, fillable at service stations, are part of the engine's equipment.

U. S. BURIES 6 BILLIONS IN GOLD

by Ollie M. James

Protected by water, gas and electricity, Uncle Sam guards six tons of yellow metal from gangland and foreign foes.

Aerial view of the new treasure vault at Fort Knox, Ky., where the Government is guarding its hoard of several tons of gold.

The fast 11-ton fighting monsters of the mechanized cavalry which will guard the vast treasure. Bristling with guns, they travel at 55 miles an hour.

The big vault as it looked under construction. Made of cement and steel, it boasts every protective feature known to science.

WITH utmost secrecy, Uncle Sam has buried the largest gold cache in history —192,000,000 ounces of the precious yellow metal worth $6,000,000,000. Where he has buried it, however, is no secret.

The lock box for the lion's share of the world's gold is a treasure chest that is a marvel of modern engineering. Located at Fort Knox, Kentucky, 30 miles southwest of Louisville, the vault is equipped with every burglar-proof device known to science and is bomb-proof and gas-proof.

Rising two stories above ground on a concrete base ten feet deep and padded with tons of re-enforcing steel as a precaution against tunneling, the building has walls of steel coated with layers of cement of secret thickness; water pipes that can immediately flood the whole building in case of emergency, and steel plates surrounding the inner vaults that set off deadly fumes as soon as a blow torch is applied.

But the most powerful protection will be the United States Army's only mechanized cavalry unit with its squadron of Christie cars—11-ton fighting monsters able to travel 55 miles an hour over any terrain. With an elaborate air defense, Fort Knox will be a tough nut for any big-scale gang foray or an

[*Continued on page* 128]

MADAME TUSSAUD'S

Madame Marie Tussaud, who founded famous wax works in London in 1835. During the French Revolution heads of her friends at the court of Louis XVI were brought to her in Paris from guillotine to be modeled for posterity.

Madame Tussaud's exhibition hall in London, famous for its Chamber of Horrors, where none is allowed to spend night alone for fear he will go insane amid gruesome surroundings.

YOU wouldn't be allowed to spend the night alone in the famous Chamber of Horrors in Madame Tussaud's wax works museum on Marylebone Road, London, even if you wanted to. Each year, scores of thrill-seeking men and women make this request and are turned down—the management is afraid they'd get the jitters and go insane long before the night had ended.

There are plenty of honest-to-goodness shudders in this little basement room containing the effigies of Europe's most notorious criminals and showing the gory details of their crimes. Corpses with daggers in their hearts—headless figures fresh from the guillotine—men and women being strangled, beaten and tortured—a gallows with a dead man swinging to and fro. Dim lights heighten the illusion of reality, and visitors silently tip-toe about as if afraid these gruesome figures might come to life.

But on the floors above the atmosphere is different, for there is housed the main part of the Tussaud collection—more than 400 wax figures representing prominent persons, both living and dead, in every walk of life. There are soldiers, statesmen, authors, sportsmen, explorers, churchmen, inventors, aviators, bankers, business men, kings, queens and movie stars. All are so skilfully modeled, so utterly human in appearance, that you find it difficult to believe they are only wax dummies with sightless eyes and silent lips.

Many Americans visit Madame Tussaud's each year and find their country well represented in the collection. A model of President Roosevelt has been added to the section labeled "American Presidents and Statesmen." He is shown seated opposite the

WAX WORKS

by
• Richard H. Parke

Headline makers, lifelike in wax. Left to right—Realmleader Hitler; King Carol of Roumania; Soviet Dictator Stalin; Mussolini; the late Field Marshall Von Hindenburg; Haile Selassie, the vanquished King of Kings; King Leopold of the Belgians, and Engelbert Dollfus, assassinated premier of Austria.

effigy of former President Hoover and behind him are grouped Presidents Washington, Taft, Wilson, McKinley, Johnson, Lincoln, Theodore Roosevelt, Harding, Cleveland and Coolidge.

In other parts of the museum are such well-known Americans as General John J. Pershing, Wallace Beery, Jackie Cooper, Marie Dressler, Amelia Earhart, Bobby Jones, Colonel Lindbergh, Lady Astor, Mrs. Helen Wills Moody, Norma Shearer, Gene Tunney, Gar Wood, Benjamin Franklin, Katharine Hepburn and Mae West.

Naturally, the exhibition is international in scope and favored sons of every country since the sixteenth century are included. But the most interesting to the modern visitor are the men and women who make today's headlines or are famed in history.

In this category are the figures of Hitler, Mussolini, James Ramsey MacDonald, Lloyd George, Eamon De Valera, Greta Garbo, Haile Selassie, King Emmanuel, Kaye Don, Pierre Laval, Marconi, H. G. Wells, Gandhi, Samuel Hoare, Voltaire, Sir Francis Drake, Marlene Dietrich, George Bernard Shaw, the Queen Mother Mary—the list is endless.

The latest exhibit attracting attention now is the figure of Mrs. Wallis Simpson. The waxed Baltimore belle, in the niche formerly occupied by King George V, is dressed in a scarlet evening gown, high-necked in front and sleeveless and backless, made in Paris by Worth. Her blue glass eyes stare at the figure of the Bishop of Canterbury. A short distance away the waxed Duke of Windsor—the abdicated Edward VIII—also stares coldly at the gaitered churchman.

The man responsible for the modeling of most of these figures is Bernard Tussaud, great-great grandson of the illustrious Madame Marie Tussaud, who founded the museum in London in 1835. Madame Tussaud, now almost legendary, learned the art of wax modeling in Paris from her uncle, John Christopher Curtius, and she, in turn,

A French aristocrat realistically receives the "Kiss of Death from Mme. Guillotine" during Reign of Terror of French Revolution in 1789.

taught it to the ladies of the court of Louis XVI. It was Madame Tussaud who, after the French Revolution, modeled the heads of her former friends after they had been brought to her from the guillotine!

Bernard Tussaud has carried on the tradition but, unlike his ancestor, he has not been able to do much of his modeling from life—or death. Today prominent persons are too busy to pose and he has had to reconstruct his figures from photographs, literally hundreds of them for each subject.

After a representative collection of photographs has been assembled, Mr. Tussaud begins modeling the head in clay exactly as though he were making a bronze. When the clay head is completed a plaster-of-Paris mold is made and the wax is poured on and allowed to harden. The wax head is complete except for the eyes, which are inserted through a hole in the back.

Each hair in the head, eyebrows and eyelashes is inserted by hand—the task of Miss Beatrice Tussaud. Human hair is, of course, used and it is matched for color and texture as nearly as possible with the original. When

Visitors daily pick up this nodding woman's program from floor, place it in her lap, and then discover that the "sleeper" is wax.

One of the latest additions to the famed Tussaud collection is this effigy of Mrs. Wallis Simpson. An attendant is putting the final touches on the life like figure. It was rushed into place as King Edward VIII abdicated.

teeth are visible, they are inserted next and then the complexion is sprayed on.

Meanwhile, the body is being constructed of papier-mache. This, like the head, is shaped to conform with the original. The hands are of wax but the arms and legs are of the same material as the body. Often, however, the arms must be of wax, particularly if the subject should be a woman in evening dress. After the costume has been assembled—again an exact copy of the original—it is fitted to the body, the head, arms and legs are attached and the figure is ready for exhibition.

Two lifelike figures that actually fool the visitors time and time again are those of a policeman and an old lady. The policeman stands near one of the staircases and each day a half dozen persons go up to him and ask a question—only to learn to their amazement that he cannot reply.

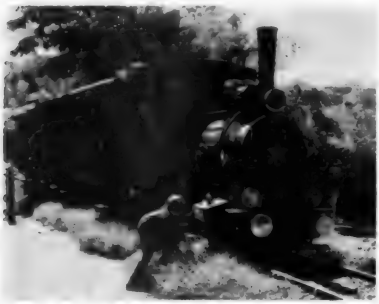
The old lady, a familiar figure for years at the museum, is seated on a bench in the center of one of the exhibition rooms. She is nodding as if she were asleep and on the floor in front of her is a museum program, which has apparently slipped from her lap. The number of persons who have politely picked up that program and replaced it on her lap is unbelievable.

The management is constantly on the alert against visitors who have fancied grievances against persons in public life whose effigies are in the Tussaud collection. Not long ago several youths expressed their disapproval of the Nazi regime by smearing red paint over the effigy of Herr Hitler. But in contrast to this, there was the case of the elderly German woman who asked permission to lay a wreath of flowers at his feet on his birthday. This was granted, but the management discovered to its surprise that the woman not only had left a wreath but a long poem in German praising the Dictator's qualities.

New additions are being made periodically to the collection—as fast as Bernard Tussaud can turn them out—and each new figure seems more lifelike than the last. One million men, women and children from all parts of the world passed through the turnstiles last year.

President Roosevelt and Mrs. Helen Wills Moody, tennis champion, are among the many Americans enshrined in Madame Tussaud's. At the right Bernard Tussaud (in smock), great-great-grandson of Mme. Tussaud, works on a figure of William Wilberforce, member of Parliament from 1784 to 1812 and credited with abolishing slavery in the British Empire, as John T. Tussaud, consulting artist, watches.

Soviet Youngsters Operate Miniature Railroad



A railway, run entirely by children, is in operation at Tbilisi, formerly Tiflis, capital of Soviet Georgia. All the rules of a real railroad apply to this tiny one.

YOUNGSTERS everywhere dream of becoming locomotive engineers, firemen and conductors. Those of Tbilisi, formerly Tiflis, capital of the Soviet state of Georgia, are among the lucky ones who have an entire railway system of their own, modeled exactly after the big Russian trains. Any one can buy tickets on this mile-long line, but only children who excel in their school work can enter the training course. Naturally, they all vie to qualify as switchman, station-master or engineer. The tiny system is organized like a real railroad, with discipline and all responsibilities taken very seriously. The few adults who supervise the line stay very much in the background. The young railroaders—boys and girls alike, as the Russians employ women on their railways, too—win their jobs and promotions through strict merit system, similar to that in force on the famous trans-Siberian Railroads.

Machine Typewrites Music

A NEW aid to writers of music is a typewriter invented by Gus Rundstatler, of Frankfurt, Germany. When punched the keys of the machine strike musical notes instead of letters. While authors have been aided in their writing by a machine for nearly a century, musicians up to now have had to do all their writing with pen and pencil. While a musician cannot compose on the machine in the same way an author does, it will speed up the arduous task of copying music. With the new device, however, a composer has to be careful. A typographical error sounds much worse than it looks.

Composers can now sit down to their typewriters, like authors, and dash off a composition. This machine, invented in Germany, strikes musical notes instead of letters.

Reel Size Of A Peanut

Not quite as big as a peanut is this fishing reel, believed by its inventor to be the smallest in the world. It weighs a twelfth of an ounce and is ½ inch in diameter.

C. S. CARTER, of Miami, has invented what he believes to be the world's smallest fishing reel. It weighs only one-twelfth of an ounce, is five-eighths of an inch in diameter, nine-sixteenths of an inch long, and geared 3 to 1. Carter claims the reel will wind 40 feet of No. 1 fishing line. It is not as large as a peanut. It has proven efficient when put to actual use.

Hat Measuring Device Attracts New Customers

A NOVEL method of attracting new customers is used by the Lancaster-Florey Hattery of Tulsa, Okla. A conformateur device, seldom seen outside of large hat manufacturing plants, is used to measure customers' heads to insure correct hat size thereby eliminating headaches and excessive perspiration caused by an imperfectly fitted hat.

The device has a wooden brim supporting a crown frame in which pointed wooden posts are inserted. A paper placed within the crown is pierced by the posts when frame is closed, indicating the contour of the head and serving as a pattern for making a correctly fitted hat.

When customers are measured for a hat with this conformateur device they are assured perfect fit. Device has pointed posts which pierce paper form, making pattern for hat.

Ponycycle Travels 45 M.P.H.

This front wheel, direct drive, midget cycle was invented by Albert A. La Pointe, of Hartford, Conn. It has no gears or clutch and 16 h.p. engine starts by pushing cycle with foot.

A DIMINUTIVE cycle, capable of speeding at 45 m.p.h., and said to travel 100 miles on a gallon of gasoline, has been invented by Albert A. La Pointe, a toolmaker of Hartford, Conn. The vehicle is four feet long and weighs only 100 pounds.

The engine cylinders are mounted on each side of the front wheel as part of the front fork, having connecting rod bearings attached to an open crank to drive the wheel. Air for the carburetor is supplied through the handlebars, and the hub of the front wheel comprises the spark distributor.

Special Cars Speed Service

SPECIALLY built streamlined rail cars are being used by the Great Western Railway in England to insure rapid delivery of parcels to towns en route. Driven by two 130-horsepower Diesel engines, the cars are capable of a 75-m.p.h. speed.

Built by the Associated Equipment Co., Ltd., of Southall, Middlesex, the cars are similar in design to the passenger rail cars in service on the railway excepting that three glass-paneled doors on each side replace the usual observation windows.

The new service has speeded up both parcel delivery and passenger service. Passenger trains are no longer delayed at stations while their baggage cars are unloaded of parcels, the new delivery cars hauling all packages and bundles consigned en route. Delivery cars run on day and night schedules.

Streamlined rail cars, powered with two 130 h.p. Diesel engines, speed up parcel delivery service on Great Western Railway in England. Three glass-paneled doors facilitate loading.

NEW YORK Plans

Where stars will shine in '39—proposed planetarium for New York World's Fair. It can duplicate constellations Washington saw 150 years ago or as they may look 100 years hence.

by A. L. White

IN 1939 all the world will help America celebrate the 150th anniversary of the inauguration of George Washington as first President of the United States. The event took place in New York City ,and to mark the occasion Gotham is building the greatest international exposition in annals of world fairs.

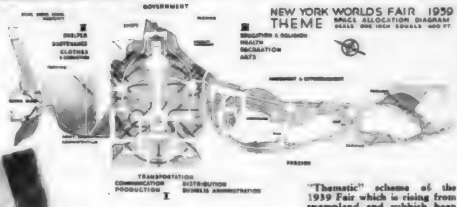
Across the East River in the Borough of Queens, on Long Island, in about the geographical center of Greater New York, lie the Flushing Meadows, a 1,216-acre tract sometimes dignified by being called the Valley of the Flushing River. But Flushing River is little more than a meandering creek and much of the "valley" is so low-lying that for ages it has been simply a salt marsh and for the past 30 years part of it has been a rubbish heap.

The southern portion is still very much as it must have appeared to George Washington, with wooded slopes on each side and stands of waving swamp grass on the valley floor, with little snakelike ribbons of water gleam-

One of the nine thresholds to the 1939 World's Fair. Fifty million people are expected to attend $125,000,000 fete.

GREATEST FAIR

Bird's-eye perspective showing how New York's 1939 "Fair to end all fairs" will look.



"Thematic" scheme of the 1939 Fair which is rising from swampland and rubbish heap in Queens Borough, New York.

The "Theme Towers" of the Fair, which will dominate array of strange, colorful buildings.

ing through. But on the northern part of the land some 300 acres have been covered with hills of ashes, rising in the highest mound, called "Mount Corona," to a height of 90 feet. These 7,000,000 cubic yards of ashes are now being converted into fill for the fair grounds.

Since last June this tract has been the scene of great activity. Clouds of dust arise during the day, and at night the glare of flood lights has been so great that residents two miles distant have complained. Already more than 2,000,000 cubic yards of ashes have been spread over the lowland. "Mount Corona"

[*Continued on page 120*]

Electric Wiring In Walk Cleans Off Snow And Ice

A sidewalk that makes snow shovelling unnecessary was tried out at New Haven, Conn. Photos shown workman laying cement over electric wires, and the efficient thaw resulting.

SIDEWALKS free from the irksome job of early morning snow shoveling were successfully tried out this winter at New Haven, Conn. Asbestos-insulated lead-sheathed electrical cable was laid an inch below the surface in the concrete. The electricity used was about 40 watts per square foot, and the consequent rise in temperature was about 20 degrees, so that snow melted and ice formation was prevented at temperatures as low as 15 above zero, lessening danger of walk cracking from cold.

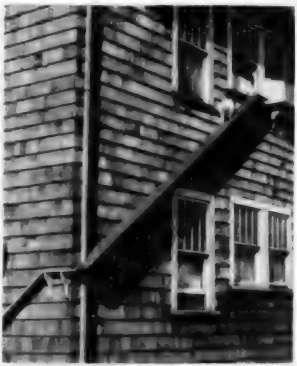
Pianist Uses Metal Hand

KEPT from playing the piano through the loss of an arm, Bert R. Amend of Portland, Oregon, invented a hand with which he is able to play reasonably difficult pieces.

Made of metal, the device straps to the stump of his arm and extends to the keyboard. From a cross bar is an octave reaching hand with five rubber covered fingers and four thumbs. The fingers project above the thumbs, and are set at irregular intervals for playing chords. Four rubber disks form the thumbs. They are used to play thirds, fourths and minor chords. Amend plays difficult pieces in a harmonious and rapid manner.

Deprived of one arm and still desiring to play the piano, Bert R. Amend, of Portland, Oregon, invented this piano playing "hand," and can render difficult pieces harmoniously.

Kitty Has Private Entrance



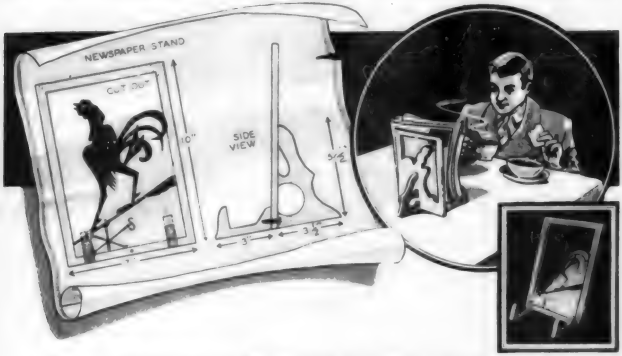
This cat, owned by Robert Whieter, Quincy, Mass., goes and comes as she pleases through a private door on the only true "cat walk" in world which leads from second floor to ground.

BOTHER of putting out the cat—a nightly ritual in millions of homes all over America—has been eliminated by Robert Whieter, of Quincy, Mass.

Mr. Whieter conceived the unique plan of building kitty a door and stairway of her own leading to the ground from the second floor of his home. Now Pussy comes and goes as she pleases, nimbly climbing up and down the "stairs" at will. To make angle of incline less steep, the ramp is carried around a corner.

WORKSHOP HOBBIES

A Newspaper Stand For Breakfast Readers



For those who must glance at the headlines while having their breakfast a newspaper stand such as the one described here provides a practical solution to the problem. The paper sets up in the rack and allows both hands to be free while reading. A plywood panel measuring 7 by 10 inches forms the back. Supports are cut out on a scroll saw. To add to the stand's attractiveness a colored picture is pasted to panel.

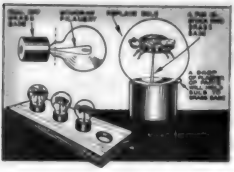
YOU can read your morning paper as you eat your toast and drink your cocoa with the aid of this novel newspaper stand. Constructed from odd pieces of lumber from the home workshop its cost to build is practically nothing. A brightly colored illustration from a magazine provides an attractive decoration for the rack which is finished with a pastel shade of quick drying enamel.

To make the stand first cut the plywood back to 7 by 10 inches in size. Select an appropriate illustration from a household magazine or calendar and glue to the plywood exercising care so that no wrinkles result. While the picture is drying the supports can be cut. Any available ½ inch stock will serve nicely for this purpose. Lay out the scroll design on the wood and cut out on a jig saw. The paper racks are then made in the same manner. If desired, it is possible to make both rack and support in a single piece using two supports on the back of the stand instead of a single one in the center.

When the picture which was pasted to the plywood panel is thoroughly dry cut out all unnecessary background portions with the jig saw. In the stand illustrated here the entire background on the lefthand side of the rooster was removed. A 1 inch border is allowed to remain to provide the frame effect.

Sand down all rough edges and carefully assemble the racks and support to the plywood panel with flathead wood screws. Complete the stand by applying a coat of shellac, sand when dry and follow with a coat of quick drying enamel carefully applied.

NEW KINKS FOR HOBBYISTS

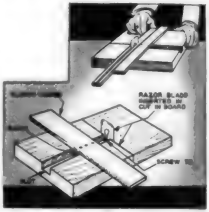


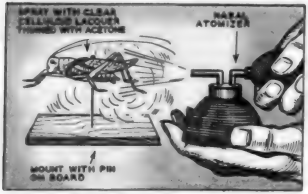
Headlight Bulbs Protect Specimens

AUTOMOBILE headlight bulbs which are no longer suitable for their intended purpose can be formed into novel biological specimen vials by cutting off the bottom of the bulb and removing the filaments. The brass base is then filled with plaster of Paris and a pin anchored in the center as shown. Insert the specimen on the pin tip and place the bulb in position.

Balsa Cut On Razor Blade Slicer

MODELMAKERS will find this balsa wood slicer ideally suited for cutting model plane wing spars, ship trimmings and other small balsa parts. To make the slicer get a board 8 inches square having a thickness of 1 inch. Groove the center a distance of 6 inches making a saw cut across the board at this point to a depth of ½ inch. A block just large enough to fit into the groove is cut from any hard wood and to it a piece of plywood is attached to serve as a sliding gauge.





Lacquer Saves Specimens

THE amateur scientist can preserve small bug and beetle specimens in his collection so that they will last indefinitely simply by spraying them with a thin film of celluloid. Dissolve pieces of scrap celluloid in acetone until a solution the thickness of lacquer results. Pour this in a small nasal atomizer and spray over the specimen which is mounted to a small block of wood with a pin.

Imitation Oil Paintings

LITHOGRAPHED calendar pictures or magazine illustrations of famous paintings can be treated so as to look like the original painting itself. After selecting a suitable picture moisten the reverse side and with the finger tips rub off the paper plys until the picture is faintly visible from the back. Secure a piece of coarse weave canvas and glue it to a sheet of heavy beaver board. Next, apply a coat of thin glue to the surface of the canvas and attach the thin lithographed painting. Press lithograph down on canvas to bring out weave and allow to dry. For crackle effect apply thin musilage.

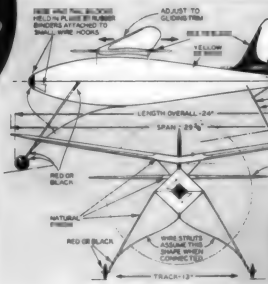
BUILD "CLOUD HOOKER"

A NEATLY DESIGNED MODEL ENDURANCE PLANE

Easily built, this plane is capable of flights of 3 to 9 minutes.

As the above photo clearly shows, the "Cloud-Hooker" is of modern design from nose to tail. Sweptback, tapered wings provide a degree of efficiency and stability quite unusual in a model of this type. At right (above)—Correct method of launching.

by Lewis Hazelton



The "CLOUD-HOOKER" SIDE & FRONT ELEVATION SHOWING FLYING ASSEMBLY AND MISCELLANEOUS DETAILS OF FINISHING TRIM

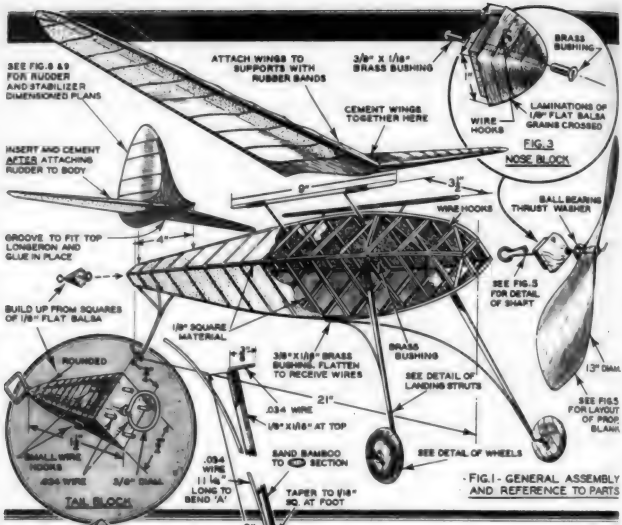
The general appearance outline drawings above are in true scale. They afford an idea of the beautiful lines of this endurance flying model.

HERE is a cabin endurance model which will appeal to practically all model-builders, from the ones just out of the beginners stage to the expert. It is a very neat and good-looking ship and besides being an excellent flier it is eligible in National Aero Reserve, Jr. N. A. A. and Jr. Birdmen of American contests. The times of this model, under varying weather conditions were from 3 minutes and 12 seconds to 8 minutes and 15 seconds. Its simple and strong construction guarantees many flights, while the graceful lines and symmetry will rate it a place in any model-builders den.

First, you will have to make full size drawings of the whole ship, then place a piece of waxed paper or oiled paper over it. Since fuselage supports all the other parts, you will build it first, following plans in Figs. 1 and 4.

Arrange pins around the outside of the pattern of one side of the body. Then take the ⅛x⅛ balsa, wet one end of it and place in position, with the wet end at the nose of the fuselage, on the inside of the pins. Hold in place with pins. Do the same for the other longeron and allow to dry.

In the meantime, the spacers may be cut from ⅛x⅛ balsa, making sure that you cut the ends at the correct angle, in order to get a perfect joint. This is one of the criteria of building model aircraft. Four of each spacer are made exactly alike, making sure not to mix them with the others. When the longerons are dry, cement one of each spacer in its corresponding place on the plan. When the



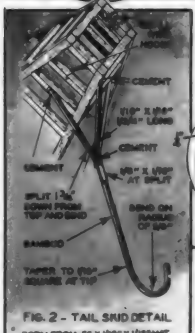


FIG. 2 - TAIL SKID DETAIL
FORM FROM 5" X 1/16" X 1/16" WIR.

LANDING STRUTS
MAKE 1 LEFT, 1 RIGHT

Study these drawings carefully before attempting to construct "Cloud-Hooker." A number of important parts are shown besides general assembly of the model. Note sturdy construction indicated.

BLUEPRINT plans for building "Cloud Hooker" are available in full scale size form at $1.50. Order blueprint M-409 from Modern Mechanix Publ. Co., Greenwich, Conn.

cement dries thoroughly, take the inside pins out of the plan, leaving the outside pins just as they are and carefully lift the balsa frame. Now duplicate the fuselage side, following the same procedure. When you have the two sides made, take and place them so they are perpendicular to the board and parallel to each other. Pin in place. Now take the remaining spacers and cement them in their proper places, taking care not to let the body get out of line. Next, build up a nose block of ⅛ flat balsa squares, laminated cross-grained, to fit the nose as shown in Fig. 3. When this is completed, drill a hole through the center and insert a brass bushing. The tail block is made the same way and the wire winding hook inserted according to detail drawing, Fig. 1.

Next small triangular pieces of ⅛ flat balsa are cemented in place at the fourth spacer on the side longerons and the brass bushings cemented to these so they protrude slightly. Fig. 1 shows this construction. The flange is cut off the last bushing, and the brass tube thus made is flattened and cemented to the

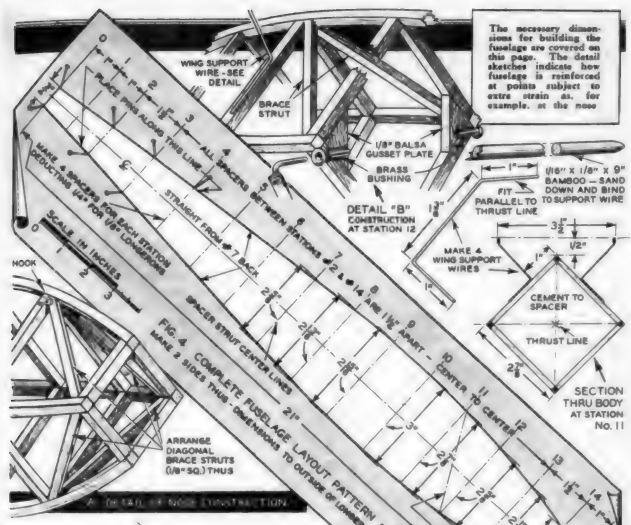


FIG. 4 COMPLETE FUSELAGE LAYOUT PATTERN • MAKE 2 SIDES THUS - DIMENSIONS TO OUTSIDE OF LONGERONS

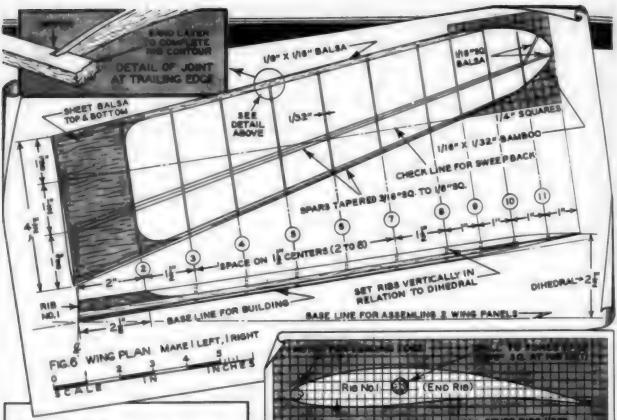
FIG. 5 PROPELLER BLANK

bottom longeron between the sixth and seventh spacers. After which the wing supports are cemented on, and when you are going to cover, use small pieces of tissue.

The struts are made of bamboo tapered from $\frac{1}{8}$x$\frac{1}{8}$ at the top to $\frac{1}{16}$ sq., and are 8 in. long. The wire braces are 12 in. long apiece. The wire angles at the top of the bamboo struts are inserted in the brass bushings at the fourth spacer. The ends of the wire braces are inserted in the flattened tube on the bottom longeron. The wheels are made in the same manner as the nose and tail blocks and are ¼ in. thick. Aluminum tubes are inserted and cemented to make a bearing.

All wire parts are now cemented to the bamboo struts and bound in place with heavy thread. The bamboo tail skid is now made from a piece of bamboo 5 in. long tapered from $\frac{1}{8}$x$\frac{1}{8}$ to $\frac{1}{16}$ sq. and the thin end bent into a tight curve. Then the thick part is split 1¾ in. and bound. A piece of bamboo 1¾ in. long by $\frac{1}{16}$ sq. is inserted in the slit at the angle in the plans in Fig. 2 and everything is given a heavy coat of cement.

Carve the propeller from medium hard balsa using the above patterns in laying out the block. The blades taper from ¼" thick at the hub to ⅛" thick at tips. Cover the propeller shaft hook with rubber tubing or electric wire insulation.



Lay out full size plans before commencing work on the wings. Make the required number of ribs to the proper sizes, using rib No. 1 and rib No. 10 as a guide for the others. Assemble each half wing by fitting ribs to the trailing edge spar; next fit the leading edge spar and insert the main spar. Line wings up carefully before gluing fast.

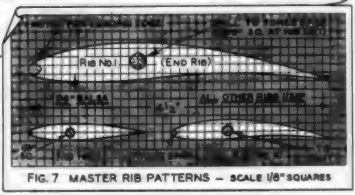
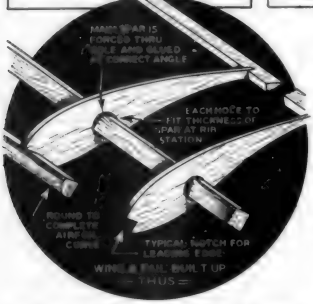


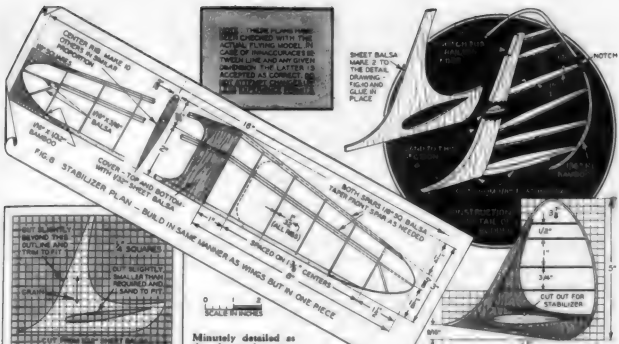
FIG. 7 MASTER RIB PATTERNS — SCALE 1/8" SQUARES



The stabilizer is built in the same manner as the wing, but in one piece. The ribs are made by taking a template which is made from heavy cardboard and drawing a sharp razor around the template over the wood. Eleven ribs are made, making sure they are the right size. The leading edges of the ribs are notched for the leading edge spar and the round holes cut or drilled and sanded to receive the center spar. The trailing edge spar is notched to receive the ribs. Assemble by pinning the trailing edge in place and cement the ribs in their notches.

Next, cement the leading edge in place and make sure all the ribs are their proper lengths. Now insert the center spar in the holes and cement in place. Bend a piece of $\frac{1}{16}$x$\frac{1}{4}$ in. bamboo to the shape of the tip and then split into two $\frac{1}{16}$x$\frac{1}{16}$ in. tips. Notch the leading and trailing edges and cement the tips in place and sand the leading and trailing edges to conform with the airfoil section. Four pieces of $\frac{1}{16}$ sq. hard balsa scrap are now cemented to the tips as shown for the tip braces. The sheet balsa covering is made in the same way as for the rudder. Four pieces are cut, one for each side on the top, and one for each side on the bottom of the stabilizer. Cement these in place one at a time and sand.

The wing is made in two halves which are cemented together before covering. The leading edge spars, are from $\frac{1}{16}$ in. sq. at the



Minutely detailed as the above plans are, the tail group will be simple to construct.

middle of the wing to ⅛ in. sq. at the tips. The ribs are made from $\frac{1}{32}$ in. hard sheet balsa except for the center ribs which are made from $\frac{1}{16}$ medium sheet balsa. A template is made for each rib; to the same proportionate shape as the one shown in the diagram. (The airfoil section is the R.A.F. 32 if you have a list of the ordinates.) Heavy drawing paper may be used for these templates since they will only be used twice; two of each rib. The holes in the center of the ribs will have to be made to fit the tapered spar. The trailing edge spar is notched for the ribs and then pinned in place on the pattern, and the ribs inserted in the proper notches, than the center spar is inserted in the holes with the center ribs slanted to suit the dihedral.

Last, the leading edge is placed in position. When thoroughly dry, sand the leading and trailing edges to conform to the airfoil section. The bamboo tips are made the same way as the ones on the stabilizer and are of the same thickness. The leading and trailing edges are notched and the tips cemented in place. The sheet balsa covering is made the same way as the stabilizer's and $\frac{1}{16}$ sq. balsa scrap tip braces are put in place. When everything is dry, cement the two wing halves together, using plenty of cement. Use blocks of wood to brace the wings together and allow to dry at least an hour before handling it.

The rudder is very simple and strong. A drawing must be made of the rudder, on some scrap paper. The leading edge is of ⅛ flat balsa cut to the shape in the drawings and notched for the bamboo outline. The bottom rib is made of ⅛ flat and also is notched to receive the bamboo outline, which is made of $\frac{1}{32}$ round bamboo bent to shape over a gas flame.

The ribs are of $\frac{1}{32}$ hard balsa. They are made by cementing rectangular pieces of wood to the outline of the rudder and then sanding to shape. After that the pattern for the covering of sheet balsa is cut from the scrap paper and traced on the medium balsa sheet. The grain of the wood must run vertically and this means that the wood must be more than two inches wide, so you take two

[*Continued on page 122*]

MATERIALS REQUIRED

7 pcs.—⅛x⅛x36 medium balsa—fuselage longerons and spacers, stabilizer spars
2 pcs.—⅛x⅛x36 med. balsa—wing spars
2 pcs.—⅛x⅛x36 hard balsa—trailing edges of wing and stabilizer
1 sheet—⅛x2x36 hard balsa—laminated wheels—nose and tail blocks, rudder leading edge
1 sheet—$\frac{1}{16}$x2x18 medium balsa—center ribs
1 sheet—1/32x2x36 hard balsa—ribs (wing and tail)
1 sheet—1/32x2x36 medium balsa—covering center section of wing and tail
2 pcs.—⅛x⅛x15 bamboo—landing gear, wing supports, all tips and rudder outline
6 feet—.034 music wire—landing gear, wing supports, hooks
4 ins.—$\frac{1}{4}$ in. aluminum tubing—propeller bearing, wheel bearings
4 brass bushings ⅛x$\frac{1}{4}$—landing gear receivers, nose block bearing
1 propellor block 13x1½x1—prop.
1 free-wheeling device
1 ball-bearing washer (or ¼ in. copper washers)
Cement—dope—tissue—pins

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[*Continued on page 122*]

Carving

Imitation ivory novelties carved from soup bones provide a new craft for hobby fans.

Fine inlay work as used on this trophy can be produced from common soup bones. Completed project provides the appearance of expensive oriental ivory artistry.

by H. H. Slawson

HOMECRAFT hobbyists seeking something besides leather, metal or wood on which to exercise their creative talents, should not overlook the Saturday soup bone. An excellent, but inexpensive imitation "ivory" can be produced from the discarded shank bone, shoulder blades and other pieces of the skeletons of cows, horses or sheep. These can be carved into a wide variety of useful and ornamental objects which may compare in artistic value with priceless oriental novelties fashioned from genuine elephant tusk.

President Roosevelt was recently presented with several such soup bone "ivory" articles, made by boys working in craft classes conducted as part of last summer's recreation program in the Chicago public parks.

The basic material required in this new type of craft work is a good marrow bone from the shank of the animal. The one mother throws out after preparing the old stand-by for dinner will do, or a supply can be secured from the local butcher. The bones should be boiled for two hours to remove the fat. Too much boiling, however, takes out all the oil, making the bone hard and brittle and thus undesirable for some purposes. The porous end may be discarded and the part of uniform thickness and texture kept for use. Clamp this workable part to the table and, using a hacksaw, crosscut saw or coping saw, cut it lengthwise into slabs. A coarse file, followed by sandpaper will further smooth the bone down until it is ready for final shaping.

After boiling the juices from the shank bone and allowing it to dry thoroughly it is clamped in a vise and cut in half. A hack saw is used, as shown, for this work.

Bone Novelties

Fred Schultz, of the Chicago Recreation Bureau, who conceived this novel craft is shown putting the finishing touches on a bone letter opener. A mallet and chisel are used to produce decorative effects.

Elephant charms, alligator paper weights, letter openers and pickle forks are just a few bone novelties which anyone can make.

The pattern of the intended object can be traced on the smooth side of the bone. Then use a coping saw to cut this out roughly and follow with a file to work out the fine details and smooth with sandpaper.

To obtain the ivory effect the bone should be polished with OO sandpaper until all scratches and other marks have vanished. Next, rub the bone with powdered pumice stone using a moistened cloth so as to secure a uniform smooth surface. The final polishing is applied by rubbing the bone with a mixture of powdered chalk and olive oil.

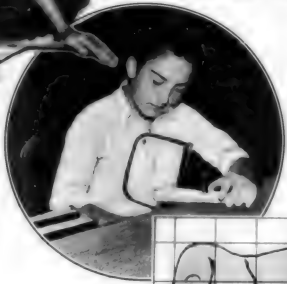
Colored novelties can be produced by adding aniline dies to the water in which the bone was first boiled or the dies can be applied to the completed article if only a surface finish is desired. Small jewelers fittings can be purchased in the form of charm rings and gold bands. These not only add to the attractiveness of the carved article, but provide a method of fastening them to ribbons or chains.

The beginner is advised only to attempt the simpler articles leaving the more elaborate ones until he has advanced sufficiently in the craft. Delicate carvings can best be handled by using a small hand electric grinding unit instead of the mallet and chisel. Besides being easier to duplicate in this manner, neater work also results.

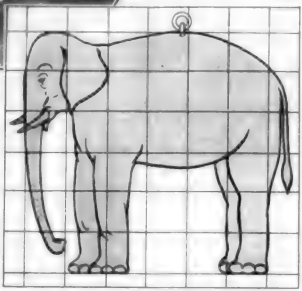
The number of articles which can be fashioned from bones is unlimited. Nut picks, salad and pickle forks, pen holders, belt buckles and novelty jewelry are only a few. Larger articles can be created by assembling smaller carvings with dowel pins and gluing together with cellulose cement.

Only common tools are required for this craft although it will be of advantage to the

After the bone has been cut in half it is filed flat with a coarse file. A 6-inch "C" clamp holds the bone rigidly to the workbench as pictured above.



After a section of bone has been filed into a flat piece of "ivory" the object to be carved is traced on the bone and cut out with a jig or coping saw as described at left. Paper patterns like the elephant charm shown below simplify carving.



clamp. Initial cuts can be made with a coping saw fitted with a hard steel blade. If the work is unusually large an ordinary hack saw can be used for making the rough cuts. Be sure that you allow sufficient bone to remain so that the fine detail work can be accomplished without carving beyond the pattern lines.

As mentioned previously, fine cuts can best be accomplished with an electric grinder fitted with the proper cutting bur. If a tool of this type is not available a sharp wood carving knife can be used for making delicate cuts in the bone. Charms can be made addi-

craftsman to equip himself with a hand drill, several files, hack saw, coping saw and a good carving knife. Careful workmanship will result in projects that will take on the aspect of genuine ivory carvings.

Where a number of carvings are to be made it is advisable to cut up a quantity of bones so as to have them on hand at all times. The bones can be cut into various shapes which will best lend themselves to the craftsman's particular needs. For pickle forks and letter openers the bones should be cut into strips measuring about 6 inches long, 1 inch wide and ½ inch thick. For watch charms and other small novelties the bone can be cut up into cubes of various sizes.

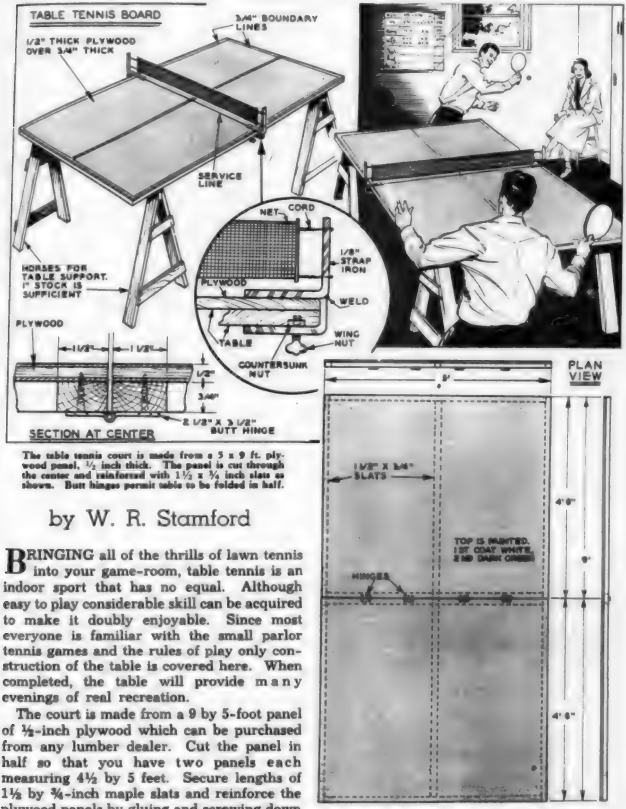
In carving a small elephant or any other charm to be worn on a chain or ribbon the pattern should first be plotted out on the bone following the graph shown in the accompanying illustrations. The pattern can be traced on the bone by first rubbing the reverse side of the graph paper with a soft lead pencil.

Where the work is large enough to permit it, the bone should be clamped fast to the workbench either with a small vise or C

tionally attractive by fitting them with colored glass eyes. Small round beads cemented in the eye recesses with cellulose cement are ideally suited for this purpose. The charm should be first completed, of course, before eyes are inserted.

In making large bone projects it will be necessary to plan your project in sections just as you would a piece of furniture. Select large bones that can be cut down to shape with little waste. After all parts have been completed the project can be assembled with glue or waterproof cement.

Build Folding Table Tennis Court



The table tennis court is made from a 5 x 9 ft. plywood panel, ½ inch thick. The panel is cut through the center and reinforced with 1½ x ½ inch slats as shown. Butt hinges permit table to be folded in half.

by W. R. Stamford

BRINGING all of the thrills of lawn tennis into your game-room, table tennis is an indoor sport that has no equal. Although easy to play considerable skill can be acquired to make it doubly enjoyable. Since most everyone is familiar with the small parlor tennis games and the rules of play only construction of the table is covered here. When completed, the table will provide many evenings of real recreation.

The court is made from a 9 by 5-foot panel of ½-inch plywood which can be purchased from any lumber dealer. Cut the panel in half so that you have two panels each measuring 4½ by 5 feet. Secure lengths of 1½ by ¾-inch maple slats and reinforce the plywood panels by gluing and screwing down to the underside as shown in the accompanying illustrations.

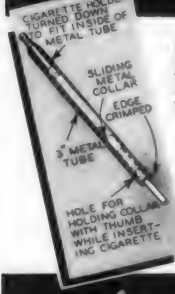
After the glue has dried lay the panels on

[*Continued on page* 124]

Construct the table according to the above diagram. After smoothing plywood surface with sandpaper apply a primer coat of white paint followed by a coat of green. Paint in boundary lines with white enamel.

CIGARETTE

A few pieces of simple apparatus and you are ready to perform this ten-minute show of thrilling magic illusions.



When a cigarette is apparently made to vanish into the magician's ear it suddenly appears in his cigarette holder. Holder, made as shown at left, conceals cigarette. Blowing on holder causes it to appear.

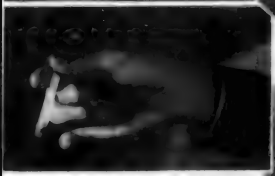
Startling onlookers, the magician puffs on a glowing cigarette and presses the burning tip against a handkerchief, but as shown at upper right, the handkerchief doesn't burn. A coin secretly held underneath absorbs the heat, preventing handkerchief's burning.

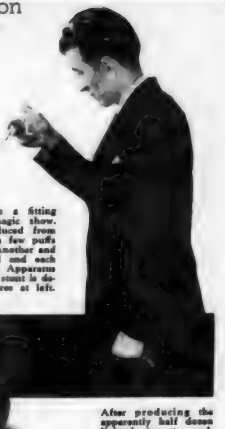
With this simple clip, formed from a pin and a brass finger clip painted a flesh color, cigarettes are produced from thin air. Closing the hand as shown at right causes the cigarette to appear.

A lighted cigarette pressed against the cheek causes no end of comment from the onlookers. To perform this stunt allow ashes to form on tip and secretly dip cigarette in water. Ashes will harden over glowing tobacco, protecting the face.

MAGIC

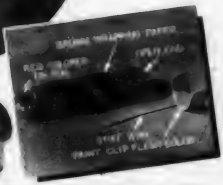
by Rudy Saxon
Famous Magician





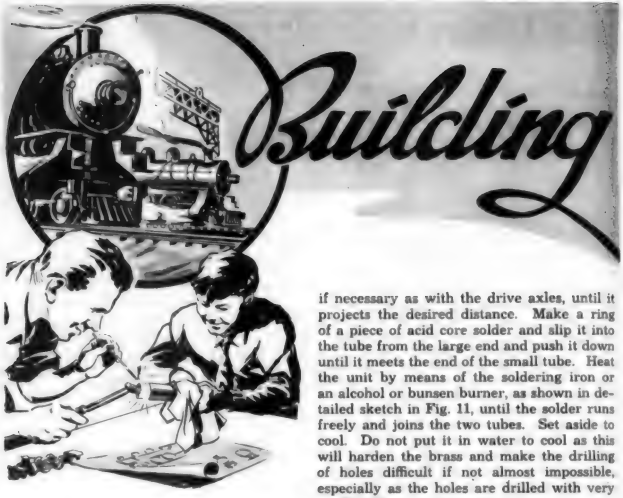
This stunt provides a fitting climax for your magic show. A cigarette is produced from nowhere and after a few puffs it is thrown away. Another and another is produced and each one is apparently lit. Apparatus for this clever magic stunt is described in the pictures at left.

After producing the apparently half dozen lighted cigarettes suddenly force the last glowing cigarette in your closed left hand and announce that you will change it to a cigar. Upon opening the hand you prove your claim. The cigar can be puffed although it is imitation. Cigarette inside provides the smoke. Make cigar as shown below.



Construction of the finger clip and imitation cigar are shown above. The cigar is formed from brown wrapping paper with red foil inserted in one end. The center is open to permit insertion of cigarette used in above stunt.

Several "bobby" hair pins fastened inside the magician's coat hold the cigarettes used in stunt described at upper right. Only one lit cigarette is used and each time a dummy is thrown away end stamped upon with the foot. The pictures above show how the clever illusion is performed.



PART II

NO HOBBY provides more thrills than model railroading. Whether it be just a simple circular track layout or an elaborate system with automatic switches and signaling equipment the model railway will provide its builder with many hours of real enjoyment.

In last month's issue of MODERN MECHANIX the first installment of this authentic 00 gauge miniature locomotive described how anyone could build it from ordinary readily obtainable materials at practically no cost except for the electric motor and driving wheels.

In this installment construction really gets under way so that the locomotive can be completed except for installing the motor.

To begin construction of the boiler, take the $1\frac{1}{4}$" brass tube and square off one end. Measure off the correct length, as shown in the detail drawing of the boiler, and saw off squarely. Carefully clean out all burrs from inside one end. Now measure off the length of the 1" diameter tube. Make sure that at least one end is squarely cut. File off all burrs from the outside edge and force it squarely into the larger tube, using the vise if necessary as with the drive axles, until it projects the desired distance. Make a ring of a piece of acid core solder and slip it into the tube from the large end and push it down until it meets the end of the small tube. Heat the unit by means of the soldering iron or an alcohol or bunsen burner, as shown in detailed sketch in Fig. 11, until the solder runs freely and joins the two tubes. Set aside to cool. Do not put it in water to cool as this will harden the brass and make the drilling of holes difficult if not almost impossible, especially as the holes are drilled with very small drills.

With the soldering iron run solder in the outer joint to form a fillet, then smooth with a scraper and emery cloth. To clarify future instructions, the large tube is the boiler while the part of the small tube that protrudes from it is the smokebox. Figure 11 shows the complete assembly.

Cut a piece of brass from the sheet, large enough to cover the smokebox end. Lay this piece on a block of wood and stand the boiler and smokebox end on it with the small end down. Press down on the boiler with one hand and run solder around the joint until it has run through and shows inside the smokebox. Trim the smokebox roughly to shape with the shears and finally file even with the smokebox sides. If this is done correctly, the joint is invisible. Cut out, using the jeweler's saw, the gear clearance slot in the rear end of the boiler and file the edges smooth. Cap the rear end of the boiler by the same method as was used to cap the smokebox.

The firebox is formed of 26 gauge brass. Bend to shape as shown on the plans in Fig. 12. For one who is inexperienced in metal working, it is advisable to cut a block of wood to the exact size of the firebox less the

MIDGET MIKE

PRIZES FOR BEST MODELS

For the neatest models of "Midget Mike" built by readers *Modern Mechanix* will award the following prizes:

First Prize—Complete kit for building a Hudson type 00 gauge locomotive.

Second Prize—Complete kit for building a air conditioned 00 gauge Pullman car.

Third Prize—Choice of one of 17 box or refrigerator car kits complete with trucks.

Fourth and Fifth Prizes—Choice of one of 17 box or refrigerator car kits less trucks.

For further particulars see next months installment.

Without the use of special tools or parts anyone can duplicate this authentic miniature model 00 gauge locomotive.

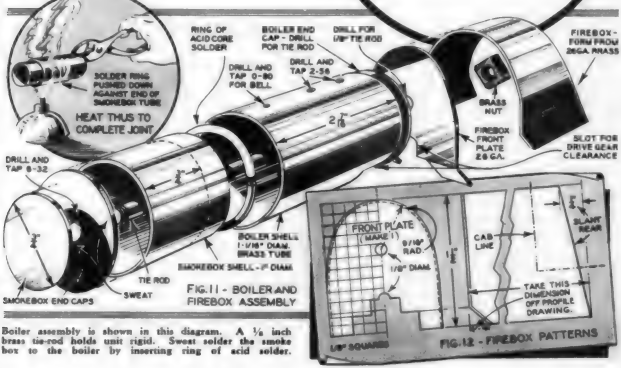
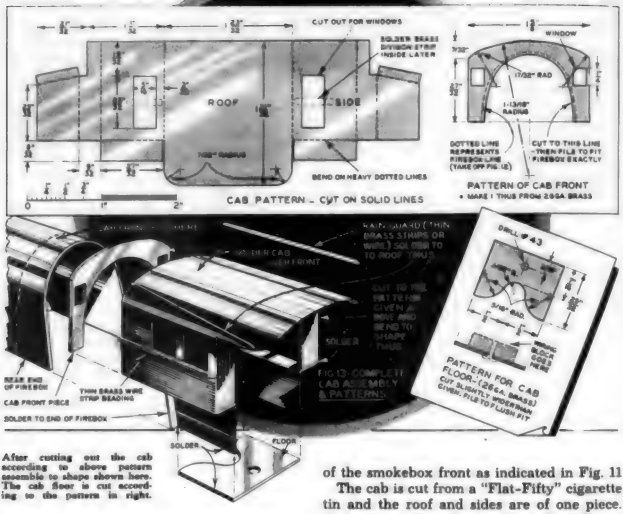


FIG. 11 - BOILER AND FIREBOX ASSEMBLY

FIG. 12 - FIREBOX PATTERNS

Boiler assembly is shown in this diagram. A ⅛ inch brass tie-rod holds unit rigid. Sweat solder the smoke box to the boiler by inserting ring of acid solder.



After cutting out the cab according to above pattern assemble to shape shown here. The cab floor is cut according to the pattern in right.

thickness of the metal used. The metal will not hold its exact shape on the first bend, but must be worked gradually until it fits snugly on the block. Solder on the front plate, while the firebox is still on the block, by the same method that was used on the smokebox and boiler ends. Now cut the clearance for the gear and motor shaft. Drill the holes as shown in the firebox front, boiler end and smokebox front. Tap the hole in the smokebox front 6/32. Now thread both ends of a 3½" length of a ⅛" brass rod with a 6/32 die. Put the rod through the hole in the rear of the boiler and screw into the hole in the smokebox front. Then put through the firebox end and put a nut on the rod and tighten. Be sure both clearance holes line up and then solder the rod to the smokebox front. File off the excess until the end of the rod is flush with the smokebox front. Now carefully flow solder into the joint between the boiler and firebox. Cut a ¾" disk from the brass sheet, and sweat it in the center of the smokebox front as indicated in Fig. 11

The cab is cut from a "Flat-Fifty" cigarette tin and the roof and sides are of one piece. Trace the outline directly from the full size plan and scribe on the tin. Bend on the lines indicated BEFORE cutting out the side windows. Place the cab on a block of hard wood and use a chisel to cut out the windows and file the edges smooth. The windows can also be cut out with the jewelers saw using a No. 1 blade. For cutting brass and bronze No. 2 blades are best. The front of the cab is cut to fit snugly around the firebox. The windows are cut out before soldering front on. Now solder the front on and then solder the cab on. The cab floor of brass is then soldered on. Figure 13 shows cut plans and detail.

The various fittings that go on the engine are now taken up. Figures 14 and 15 illustrate this construction.

The running boards are of $\frac{1}{32}$"x$\frac{1}{16}$" brass and are soldered directly to the boiler. Remember that the running board must be cut to fit around the firebox. The measurements are given on the plans, but you should measure the amount to be cut out to fit around the

firebox as it will not fit properly if the dimensions are varied at all.

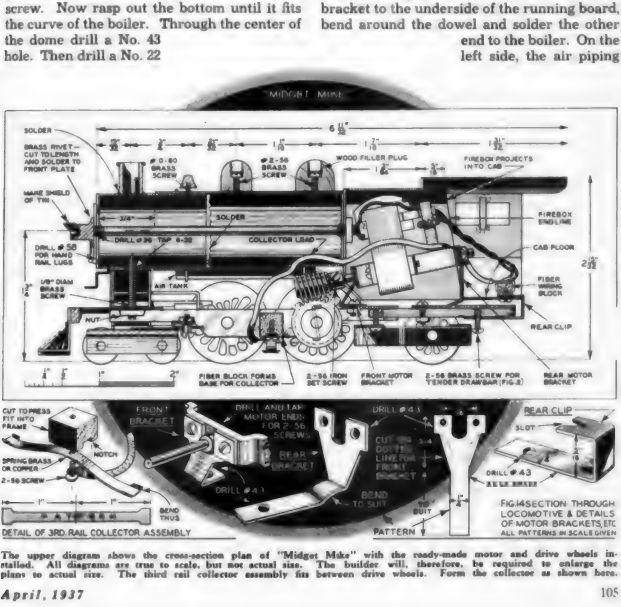
The front steps are cut from 26 gauge brass and are $\frac{3}{16}$" wide. Solder the steps directly to the underside of the running boards.

The smokestack is a piece of $\frac{1}{4}$" brass tube. Square one end carefully and file the other end to fit the curve of the smokebox. Solder in place and then solder a piece of thin copper wire around the upper edge to form a beading or lip on the stack.

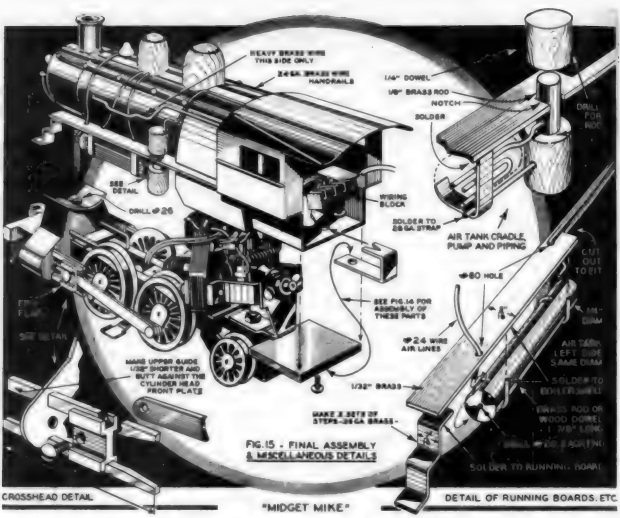
The sand and steam domes are turned from wood. The domes on the model illustrated were made from parts of clothespins, but could be made from pieces of dowel. Saw off the button on top of the clothespin and then measure down about ½". Screw a thin wood screw into the bottom and put the screw in the chuck of your hand drill. Hold the drill either between your knees or in a vise. Turn the drill with one hand and with the other hold a wood rasp against the work as it rotates, sand the work and remove the screw. Now rasp out the bottom until it fits the curve of the boiler. Through the center of the dome drill a No. 43 hole. Then drill a No. 22 hole half way through as per plan. Drill a No. 51 hole in the boiler and tap 2/56. The No. 43 hole clears the shank of the screw while the No. 22 hole clears the head of the screw. Cut a plug of semi-hard wood to fit into the hole after the screw is put in and tightened. Glue the plug in place in the dome. When the glue is dry, trim off the excess and sandpaper lightly. The curved bottom of the dome prevents it from ever coming loose.

The air pump is next constructed. File a notch in the left running board as shown. Cut two pieces of ¼" dowel to the proper length. Drill a No. 29 hole in one end of each. Now force one wooden end on the end of the brass rod. Solder the brass rod in place in the notch and then slip on the other wooden end.

The air tanks can be made either of ¼" wood dowel or ¼" brass rod. If of wood, saw to the correct length and sand the ends. With a pin, drive a hole in the center of each end for the air pipes. Solder one end of the bracket to the underside of the running board, bend around the dowel and solder the other end to the boiler. On the left side, the air piping



The upper diagram shows the cross-section plan of "Midget Mike" with the ready-made motor and drive wheels installed. All diagrams are true to scale, but not actual size. The builder will, therefore, be required to enlarge the plans to actual size. The third rail collector assembly fits between drive wheels. Form the collector as shown here.



Ingenious construction permits "Midget Mike" to be assembled like a real locomotive. Note that the cab and boiler are one complete unit and attach to the locomotive chassis with machine bolts.

is made of thin brass wire. This must be soldered to the bracket before the bracket is soldered to the running board. If the tanks are made of brass rod, saw to length and file the ends smooth. Then drill a No. 60 hole in the center of the end. Fasten the brackets in the same manner as with the wooden tanks only in this case solder the bracket to the tank as well. This is best done where it will not show. The two ends of the piping on the left side are clipped off so that they are even with and in contact with the air pump. No further fastening is necessary.

The bell comes with a hole drilled in the bottom and tapped 0-80. Drill a No. 56 hole in the boiler and tap 0-80. Cut the head from an 0-80 brass screw. Screw one end into the bell and the other end into the boiler. Do not screw the bell down onto the boiler, but leave a 2-millimeter space between the bottom of the bell and the top of the boiler.

The turned hand rail supports are now mounted in the No. 58 holes drilled in the boiler and smokebox. A No. 58 hole makes a force fit and no further securing should be necessary. However, if a support is loose in the hole, a touch of solder will do the trick. The handrail is 24-gauge brass wire inserted through the holes in the supports and clipped off close to the end supports.

The headlight on the model illustrated is made from a brass rivet. Cut the shaft to the correct length and sweat to the smokebox front. A small shield is cut from a scrap of the cigarette tin and soldered in place. The light can also be made of $\frac{3}{16}$" brass tube, and a small brass or copper washer to back it up with.

The piping is made of medium and heavy brass wire. The air line that connects the front ends of both air tanks is 24-gauge brass wire and runs through No. 60 holes in the running boards.

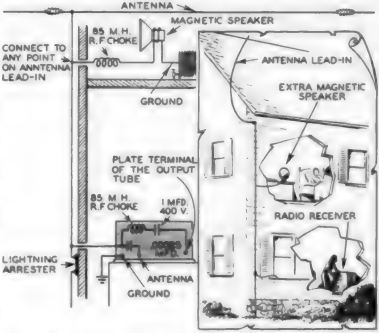
The pipe from the rear of the right-hand air tank to the cab also runs through a No. 60 hole in the running board and in the cab front. The

[Continued on page 130]

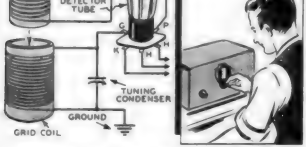
REMOTE SPEAKER CONNECTS TO SET ANTENNA

AN ADDITIONAL loudspeaker located upstairs is a convenience that many have had to do without due to wiring difficulties involved. With this arrangement any magnetic speaker can be attached to the radio lead-in wire and satisfactory reception obtained. The system need not be limited to one speaker since it is thoroughly capable of handling one or more additional speakers if they are desired.

Only four items are required to convert your antenna into a remote carrier line. Two 85 m.h. chokes, a .00025 mfd. and .1 mfd. fixed condensers comprise the materials. Connect the .00025 mfd. condenser in series with the set antenna and one of the 85 m.h. chokes in series with the .1 mfd. condenser. The free end of the choke is next attached to the antenna lead-in and the remaining lead of the .1 mfd. condenser to the Plate prong of the receiver's output tube. Attach speaker through other choke to antenna lead-in and remaining speaker wire to water pipe.



Extra radio speakers operating on the downstairs receiver can be quickly installed anywhere in the home without the use of unsightly wires. It is only necessary to connect one of the speaker wires to the antenna lead-in and ground the other wire to a water pipe as indicated in the above diagram.



Inserted inside the grid coil of the detector tube this six turn coil of No. 24 D.C.C. wire introduces fixed regeneration into any early electric set. Coil connects in series with plate of tube.

Coil Improves Set Selectivity

EARLY electric receivers of the tuned radio frequency type can be made to function with hairline selectivity like that of modern receivers by connecting a small coil in series with the detector tube plate lead and inserting the coil inside the receiver's grid coil. Fixed regeneration is introduced into the circuit producing a "peaked" tuning effect which not only provides excellent DX reception, but increasing receiver volume as well.

The coil producing the regenerative effect need not be of any specific size. A few turns of enameled or cotton magnet wire will prove sufficient and the proper location of the coil can be determined by experiment. If the receiver produces a whistle when stations are tuned in or a roar of distorted music is heard the coil should be decreased in turns until this objectionable effect vanishes.

ALL-WAVE RECEIVER

by Arno Wilkens

This amazing receiver not only provides wide world reception, but includes all attachments for operating it on any current.

AT THE present time there are on the market many excellent radio receivers, in a wide range of prices and models—all for operation on 110 volts 60 cycles alternating current. However, there are many people living beyond the reach of this current.

If these persons want new radio receivers, they can have the choice of only a few sets. Such sets usually cover only the regular broadcast band, and possibly the "police calls." An increasing number of travelers want radio wherever they go, regardless of what kind of current happens to be available. This may be the 6-volt battery in an automobile, a 32-volt farm light plant, 110-volt AC city current or 110 volts direct current.

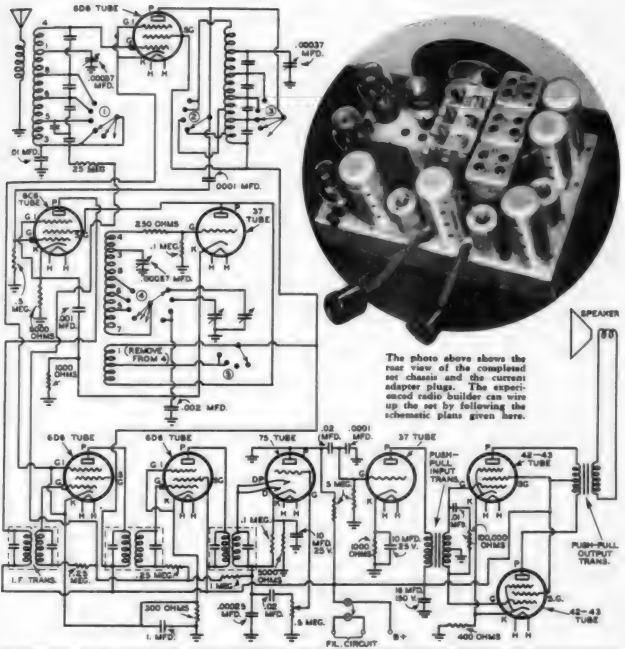
The listener who wants world-wide reception wherever he goes has the choice of carrying a set for each kind of current, or building his own set. It is the purpose of this article to describe a set designed to get any program any place any time.

The all-purpose radio consists of an all-wave tuner made of repair parts intended for a well-known "city" radio, a 2-stage 460-kilocycle intermediate frequency amplifier and an audio amplifier with pushpull output tubes. A permanent-magnet dynamic speaker gives good tone and volume without electrical field excitation.

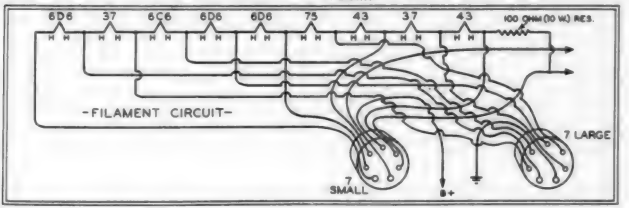
The plate voltage for the set is most easily supplied by 45 to 90 volts of "B" batteries, although for permanent installation on one kind of power, other methods might be more suitable. The filament or heater connections form the distinctive part of this set. When the set is used on 110 volts AC or DC, all the tubes are con-

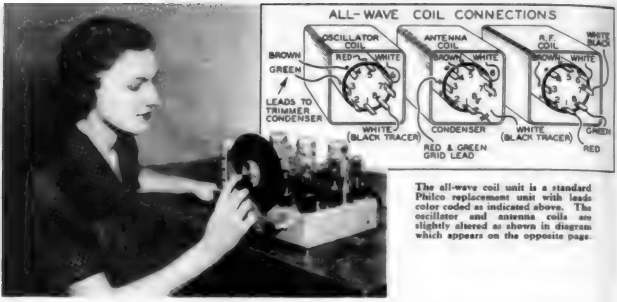
Constructed from standard radio receiver parts the all-wave set tunes in European stations as easily as local broadcasters. Miss Bettye Wertz of the MM staff is shown tuning-in on an interesting foreign broadcast.

OPERATES on any CURRENT



The photo above shows the rear view of the completed set chassis and the current adapter plugs. The experienced radio builder can wire up the set by following the schematic plans given here.





The all-wave coil unit is a standard Philco replacement unit with leads color coded as indicated above. The oscillator and antenna coils are slightly altered as shown in diagram which appears on the opposite page.

nected in series across the line, in series with a 100-ohm resistor. When used on 32 volts the tubes are connected series-parallel, the 5 RF, IF and oscillator tubes forming one circuit, the second detector and one No. 43 output tube a second and the 37 first AF and the other 43 a third circuit across the 32 volt line. For 6-volt use, obviously all the tubes must be connected in parallel, and 6-volt No. 41 or 42 output tubes used. As stated before, no field coil is used in the dynamic speaker, and therefore no provisions need be made for its excitation.

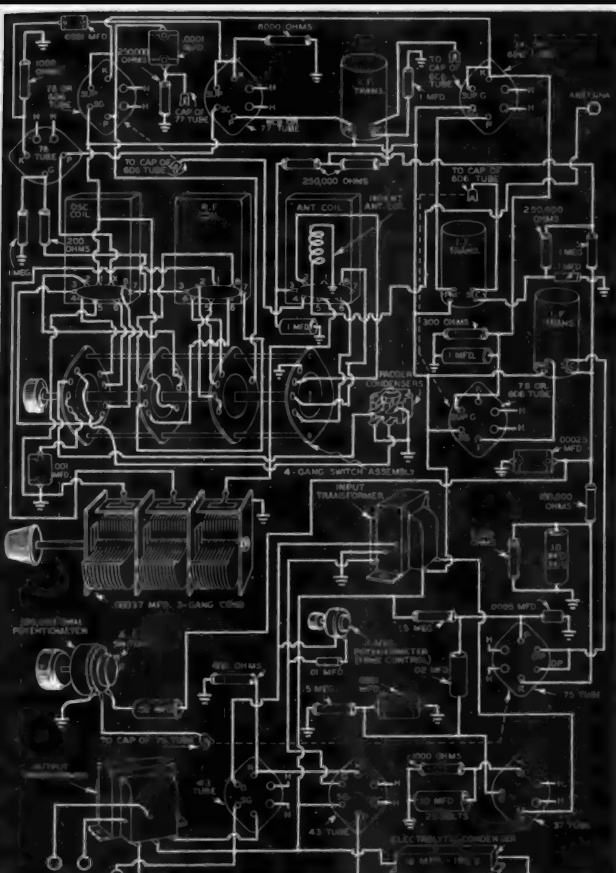
The receiver herein described uses the antenna, RF and oscillator coils, tuning condenser assembly and wave-swtich originally made for use in the Philco Radio & Television Corporation's 4-band 1936 Philco 16-set (bulletin 205). This tuning system covers the entire range from 550 to 22,500 kilocycles. It it important that if any of the specified parts are used in the tuning system, the entire set must be used, as the circuit of the coils and wave-switch is specially designed. If the builder so desires, he may use the tuning system of any other commercial set made within the last year, so long as it uses an intermediate frequency around 450 to 500 kilocycles. Examples are the RCA "magic brain," General Mfg. Co. No. 28 all-wave kit, "Tobe Tuner" and others. However, these require considerable changes in the chassis layout. If the all-wave feature is not desired the chassis layout and circuit may be used with the Miller No. 242 coils, any standard .00035 MF 30-gang condenser and an uncalibrated dial to fit the condenser selected. This covers the regular 550-1,500 kilocycle band.

The intermediate frequency amplifier and second detector are the standard type and any make of 460kc IF coils may be used without affecting the operation of the set in any way.

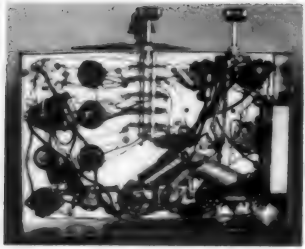
All heater connections in the set, as well as the terminals of the power switch and the 110-volt dropping resistor are brought out at two-tube sockets in the back of the set. In this way all changes in heater wiring for various supply voltages may be made by simply plugging suitably wired plugs in these sockets. While the illustrations show connections for 6, 32 and 110 volts, plugs may also be wired for use with 12-volt automobile and bus batteries and 24 and 48-volt telephone batteries. By inserting resistors in one of the leads of the 110-volt cord, so as to give approximately 110 volts at 300 milliampers at the set, it may be operated on 220-volt AC or DC lighting system, 275-volt mine power supplies, 550-volt trolley cars, 600-volt electric railways or any other kind of power that might be encountered anywhere. The plate supply leads also appear on the sockets, for convenience in supplying plate power, if the power available happens to be filtered direct current at 32 to 110 volts.

The chassis is made out of a sheet 13x17 inches, of either 18-gauge sheet iron or 12-gauge aluminum. Any well-equipped tinsmith shop can do the bending, and the socket holes are punched in with a 1¼-inch socket hole punch as available from any radio parts dealer.

Like any all-wave set, the best way to balance the receiver is by means of an all-wave oscillator. If none is available, the following method may be used. Open the broadcast band oscillator tracking condenser about 1 turn from its full closed position.



To make construction easier wire up the set according to this pictorial diagram. The antenna coil is fitted with a new antenna pickup coil consisting of 18 turns of No. 24 D. C. C. wire wound on a pencil and inserted inside the regular coil form. Disconnect primary coil from No. 4 secondary soldering lug as shown and attach independently to the new lug, "X." Tube sockets are indicated as bottom views. Only four sections of the all-wave switch are shown in circuit since fifth isn't used.



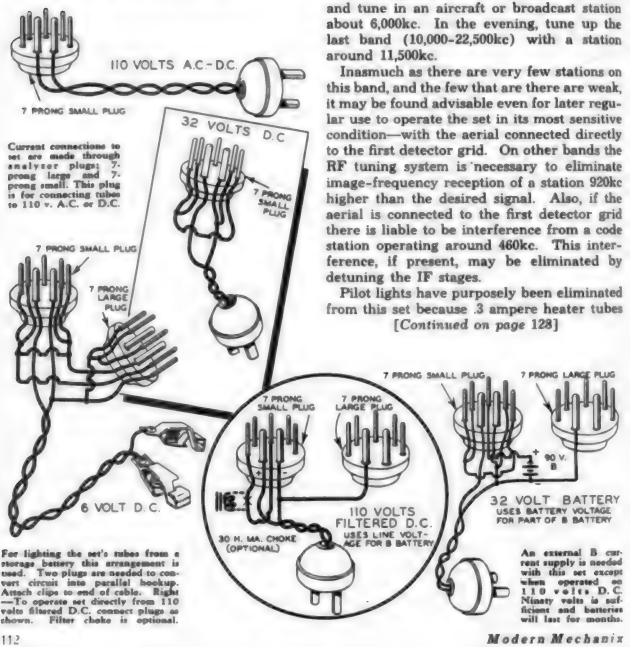
With the parts properly arranged the underside of the all-wave receiver chassis should be similar in appearance to the set shown here. Wire up the set with heavy wire.

Set the tapswitch to the broadcast position. Turn the volume on full and tune to some strong local station. If no signal is heard, remove the grid clip from the first detector tube, and connect a 100-foot aerial directly to the grid cap. If all connections have been properly made somewhere on the dial a station will be heard, at least faintly. With a faint signal on, tune both sides of all the IF transformers for maximum volume. Replace the clip and connect the aerial to its terminal. Tune the broadcast band oscillator trimmer till the station comes in at its correct frequency position on the dial. Tune the RF and antenna trimmers for maximum volume. If the set oscillates, detune the RF trimmer till oscillation stops. Set the tapswitch to band 2 (1,500-4,000kc) and tune into frequency a broadcast station at the 1,500kc end. Set tapswitch to band 3 (4,000-10,000kc) and tune in an aircraft or broadcast station about 6,000kc. In the evening, tune up the last band (10,000-22,500kc) with a station around 11,500kc.

Inasmuch as there are very few stations on this band, and the few that are there are weak, it may be found advisable even for later regular use to operate the set in its most sensitive condition—with the aerial connected directly to the first detector grid. On other bands the RF tuning system is necessary to eliminate image-frequency reception of a station 920kc higher than the desired signal. Also, if the aerial is connected to the first detector grid there is liable to be interference from a code station operating around 460kc. This interference, if present, may be eliminated by detuning the IF stages.

Pilot lights have purposely been eliminated from this set because .3 ampere heater tubes

[*Continued on page 128*]



For lighting the set's tubes from a storage battery this arrangement is used. Two plugs are needed to convert circuit into parallel hookup. Attach clips to end of cable. Right—To operate set directly from 110 volts filtered D.C. connect plugs as shown. Filter choke is optional.

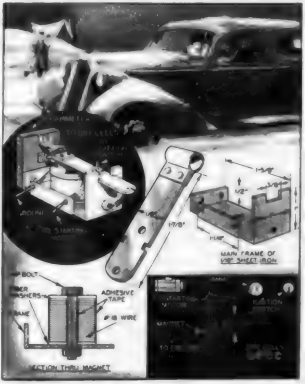
An external B current supply is needed with this set except when operated on 110 volts D.C. Ninety volts is sufficient and batteries will last for months.

Ignition Booster Eliminates Hard Starting

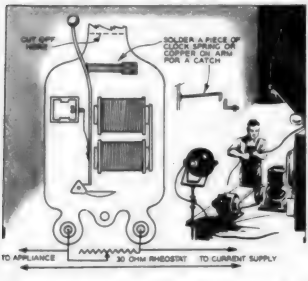
HARD starting in cold weather is not only annoying, but ruinous to the car's battery. Unless your car is fitted with a heavy duty cell it cannot be expected to supply current to the ignition system and at the same time turn over the starter motor. By installing a simple relay and booster system in the starter motor circuit the car will start in all kinds of weather at the touch of the starter button.

To make the relay, first form a frame from $\frac{1}{16}$-inch sheet iron and cut and bend it to the shape shown in the illustrations at right. Next make the armature from a strip of the same metal so it measures $1\frac{7}{8}$ inches in length. On one end drill two holes and rivet a tubular contact made from spring brass or phosphur bronze. Notch the armature and drill two small holes for spring and ignition switch contacts, then make your magnet.

The magnet is simplicity itself. Get a $\frac{1}{4}$-inch bolt measuring $1\frac{1}{4}$ inches long and slip a 1 inch fiber washer on each end. Wrap the bolt with friction tape and wind on this bobbin, formed by the bolt and washers, as many turns of No. 18 enameled wire as will fill the space. Assemble the magnet to the sheet iron frame, install the armature and wire up the unit. A small bakelite panel on the rear of the frame is provided with contacts of spring brass completing the armature switch. When completed, install the relay in series with the starter motor, one spring contact to the ammeter, the other to four dry cells and the armature to the ignition switch.



This relay automatically cuts in a separate ignition battery for cold weather starting. The magnet is wound on an insulated ¼" by 1¼" iron bolt with No. 18 enameled copper wire. Spring contacts are mounted to bakelite panel shown in circle.



With this circuit breaker installed in experimental circuits fuse blowing is eliminated. A doorbell or buzzer fitted with a hook on the armature opens the circuit when load is excessive.

Buzzer Forms Circuit Breaker

NO LONGER is it necessary for the experimenter to be constantly blowing fuses when working on new circuits or repairing faulty apparatus. An efficient circuit breaker can be assembled in a few minutes from a cheap doorbell or buzzer and a 30 ohm radio rheostat.

Remove the bell by sawing off the top portion of the frame. If a buzzer is used a length of stiff wire should be soldered to the end of the armature to form a clapper. A small piece of clock spring is bent to form a catch and this is then soldered to the bell clapper. Fit a hook for the catch to the frame so that when a current is passed through the bell the clapper is engaged by the hook and catch.

To use the automatic circuit breaker wire it in series with some appliance, shunting the 30 ohm radio rheostat across the doorbell terminals and adjusting it to a point just inside the overload point. When an excessive load passes through the bell magnets it produces a magnetic field sufficient to draw the clapper to it automatically opening circuit.

CAMERA DARKROOM SHORT-CUTS

Embossed prints can be quickly made with this simple device. Cut two sheets of 1/32" celluloid as shown. Cut out the center of one to 5½" x 7½". Take the piece removed from the center, trim the edges 1/64" and glue to lower sheet. To emboss prints place between the celluloid sheets and run through photo or wash wringer.

Prints always dry flat with this novel drier. From galvanized chicken wire form a tube 8" in diameter and solder the joint together. Wrap a length of turkish toweling around the tube and insert the prints, face down, as the toweling is rolled up. The tube when placed in a warm place will dry prints rapidly.

DEVELOPING TANK FROM OLD THERMOS BOTTLE

A pint size Thermos bottle from which the glass container has been removed makes an excellent daylight developing tank. For film spreaders wind two spirals from ⅛" copper tubing as shown and insert the ends in a length of broomstick. Attach a metal plate inside the top to keep out light.

To insure both developer and fixer baths having identical temperatures place both trays in a large pan containing water having the same temperature as specified for solutions.

• • •

Novel snapshot borders can be quickly made from ordinary heavy writing paper by folding the edges and cutting notches with a razor blade. Paint masks with India ink before using.

Open Season on Fun!

Ride a HARLEY-DAVIDSON Motorcycle

It's outdoor time—and the open season for going places! When you own a 1937 Harley-Davidson you light out for the fun spots any time—evenings, Saturday afternoons, and over week-ends. Distant places are brought nearer—your mount has speed galore. Costs are way down low—the new Harley-Davidsons have many new and unusual motor improvements which cut gas and oil consumption tremendously. No other type of transportation can match these up-to-the-minute motorcycles for economy. And say—if it's smart styling, class, and riding comfort you want—get aboard one of these 1937 models!

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HARLEY-DAVIDSON

AMATEUR PHOTO PUZZLERS

In this department the Photography Editor will answer any question or problem related to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope in case space does not permit publication of the question and reply on this page. Send all inquiries to the Photography Editor, Modern Mechanix, 22 West Putnam Avenue, Greenwich, Connecticut.

F. NUMBERS ON CAMERA ARE CONFUSING

My box camera is fitted with a slide arrangement which permits me to use only three stop openings and since no indication is given as to their F. calibration I find it difficult to follow photography kinks and suggestions appearing in the various magazines on the subject. Can you tell me approximately what these adjustments are equivalent to in the F. system?—Harry Stone, Freeport. L. I., N. Y.

The approximate F. reading of the largest stop on your box camera is F.11, the center stop is approximately F.16 and the smallest stop F.22.

MAKING DAYTIME SILHOUETTE PICTURES

Can you suggest some method by which I can take silhouette pictures indoors during the daytime? I am familiar with the illuminated cloth screen method, but desire to take pictures without the use of this apparatus in order that an actual photograph and not merely a shadow is obtained.—Barney Eline, Dayton, Ohio.

To make indoor silhouette pictures during the daytime is not difficult. First pose the subject in an open doorway or have them stand in front of a window in profile position since better effects are possible with this arrangement. Set up the camera using a large stop opening and a shutter speed of 1/25 second, aiming it directly toward the window or door. A number of unusual camera shots can be obtained in this manner.

CAMERA TAKES FADED PHOTOGRAPHS

When our box camera is used for taking snapshots in shaded areas the resulting negatives are always too thin for securing satisfactory prints. Is this trouble due to the films or camera or is the trouble due to other causes?—Raymond Beallet, Edenton, N. C.

The lens of the average box camera is usually too slow for taking pictures in shaded areas. Since the largest stop opening available is F.16 it is impossible for sufficient light to strike the film and produce a good exposure. In taking photographs with a camera of this type it is necessary that the subject be photographed in bright sunlight.

HOW TO MAKE "SEPIA" OR BROWN PRINTS

I have often wished to make brown prints of indoor portrait exposure shots which were taken with my folding camera, but have never discovered just how to accomplish. Is special apparatus required or is it all in the paper and developer used in making the prints?—Douglas T. Hill, Elgin, Ill.

If you have in your possession prints which you would like to make into brown or sepias it is only necessary to use redeveloping solutions. First bleach the black and white print in the first solution then place it in the second to secure the brown tone. Follow the instructions found on the redeveloper package.

MONTH'S BEST PHOTOS

To Emil Pearson of Red Granite, Wisconsin, went this month's five dollar award for his interesting study of a kitten well at home in a flower pot. The lower photo shows a night scene at the recent Great Lakes Exposition in Cleveland which won for Miss Mary Kundra, of Danville, Pennsylvania, Modern Mechanix's three-dollar amateur photo award.

BLISTERS APPEAR ON NEGATIVES

After developing a roll of No. 116 films I found that on several of the exposures small blisters appeared. The gelatin emulsion on these negatives had separated from the celluloid resulting in noticeable spots showing up when prints were made of the negatives effected. Can you offer some advice as to the cause of this?—Herbert Harris, Dallas, Texas.

Blisters such as you mention are caused by gas bubbles forming within the gelatin during the transfer of the film from the alkaline developer to the acid fixer bath. In order that this does not occur on future negatives be sure that you thoroughly rinse the films before placing them in the acid solution. In some instances the blistering effect is due to films being subject to sudden changes in temperatures. The amateur photographer should guard against this.

FIXING BATH SHOWS STRANGE COLOR

The fixing bath which I have stored away in a jar has turned to a milky color. Is it safe for me to use this solution or should it be thrown out?—Elizabeth McCarthy, Los Angeles, Calif.

When the fixing bath shows a chemical reaction such as you mention it is advisable to discard the solution. The cause of the milky effect is due to either improper mixing or the fixer being stored in a warm place.

In amateur photography work it is vitally essential that all chemicals be fresh and properly handled. Failure to keep them at temperatures indicated on the package or in clean trays will result only in disappointment.

The photography editor will pay $3.00 and $5.00 each for photographs interesting enough for publication on this page. All pictures should be mailed to Modern Mechanix Publishing Co., Greenwich, Conn.

Here's all there is to making Snapshots at NIGHT

1 Load your camera with Kodak "SS" Film

2 Use 2 or 3 Photoflood Lamps and Reflectors

HATE to lay your camera aside at sundown? Now you can snapshoot right around the clock—get instantaneous pictures indoors after dark with your present camera, even if it's a simple Brownie.

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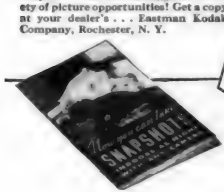
If your camera has an *f*.6.3 or faster lens, No. 1 Photoflood lamps are powerful enough.

FREE BOOKLET . . . Contains all you need to know about *both kinds* of night pictures—*snapshots* with Photoflood lamps, *fast exposures* with Photoflash lamps. (You can use Photoflash lamps, each good for one picture, if your camera can be set for "time.") The booklet's pictures and diagrams show how to arrange your lights . . . how to place your subject . . . and it even suggests a variety of picture opportunities! Get a copy at your dealer's . . . Eastman Kodak Company, Rochester, N. Y.



Seversky, Flying Inventor

[*Continued from page 66*]

aviation. He had but to await his opportunity, and that was not far distant.

At the outbreak of the World War young Seversky became a member of a bombing squadron in the Baltic Sea area. During a bombing expedition in the Gulf of Riga, his plane was shot down and the observer killed instantly. Seversky clung to a pontoon of his wrecked plane until rescued by a Russian gunboat when his right leg was found to be shattered. Hurriedly, it was amputated above the knee.

The young officer had visions of his aeronautical career ending before it had hardly begun, but with indomitable courage he fought on. Before he had fully mastered the use of a pair of crutches the welcome news arrived that he had been appointed general inspector and officer in charge of aircraft production in the Petrograd navy district. There, Seversky obtained experience in practical aeronautical engineering which was to be the foundation of many of his later inventions. Among his associates at this time was Igor Sikorsky, later to appear in this country and earn fame as designer and builder of huge multi-motored airplanes and seaplanes.

The urge to actually get behind the controls of a plane again gave Seversky no peace. The refusal of his many requests that he be allowed to fly was ever a thorn in his side. Finally, after demonstrating that his artificial limb did not incapacitate him for combat flying, Seversky was assigned as commander of a bombing squadron in the Baltic Sea. During this period his squadron was constantly engaged in air fighting and Seversky was personally credited with bringing down thirteen enemy planes.

For these heroic deeds honors came to the young aviator in rapid succession. He was presented with a gold sword by the late Emperor Nicholas II, and promoted to the rank of Commander in the Russian Navy. Later, for his defense of the entrance to the Gulf of Riga, he was awarded the highest military tribute of Russia—Knight of the Order of St. George.

It was during the lull of the winter season at Riga that the latent inventive ability of Seversky cropped out. Winters set in early in that region and the surface of the Gulf of Riga soon became a sheet of ice. Seaplanes consequently were rendered useless during winter. Seversky succeeded in designing a universal landing gear whereby naval aviation in the Baltic Sea area was able to function all year round in spite of frozen water. Seversky's reputation in this field has never faded. Many years later he designed the skis used by Sir Hubert Wilkins on his polar flying expeditions.

Other Seversky inventions of this period included a method for hunting submarines by airplane; a pilot directing system, a fire-control for pursuit plane guns, and a bombsight.

Shortly after the United States entered the World War, the Russian Admiralty sent Commander Seversky to Washington as a member of the Russian Naval Aviation Commission. Scarcely had he reached the United States when the revolutionists overthrew the Imperial Russian Government, thereby revoking his mission. Promptly, Seversky offered his services to the United States. He was accepted, and for the remaining period of the war served as an aeronautical engineer and test pilot. In a special letter he was commended for his splendid services and his loyalty to this country and its allies.

In 1921, the Secretary of War appointed Seversky as a consulting engineer for the U. S. Air Service. When it is considered that at that time he was not a citizen of the United States, it is evident that this act was indeed an unusual tribute to Seversky's aeronautical experience and ability. He became a citizen in 1927, shortly after which he was commissioned a major in the U. S. Air Service.

While serving as a consulting engineer in the War Department, Seversky designed a new bombsight, greatly improving the type he first built at Riga. This new bombsight was constructed to mechanically and automatically represent the ballistics tables and calculate the range angle. The designing of this bombsight required a combination of rare mathematical genius and a precise knowledge of mechanics. This invention proved so successful that the United States government purchased Seversky's rights to the invention. At the request of the War Department, issuance of a patent thereon was deferred some twelve years on the ground that publication of it would be detrimental to national defense plans.

The system of refueling airplanes in mid-air, which was first used by U. S. army flyers in the endurance flight of the Question Mark, was another Seversky idea.

"I first thought of refueling in mid-air while I was escorting our bombing planes in a pursuit ship," Seversky explained. "The bombers would leave the flying base well protected by pursuit squadrons, but usually half way from our objective we were obliged to leave them because of lack of fuel. After a time I came to the conclusion that it would be more logical for the bombers to carry fewer bombs and more gasoline and, if possible, act as fuel carriers for their escort planes. In trying to find a way by which this idea could be carried out the thought came to me that the fuel might be transferred through a lowered tube. At that time, however, the plan seemed

[*Continued on page* 154]

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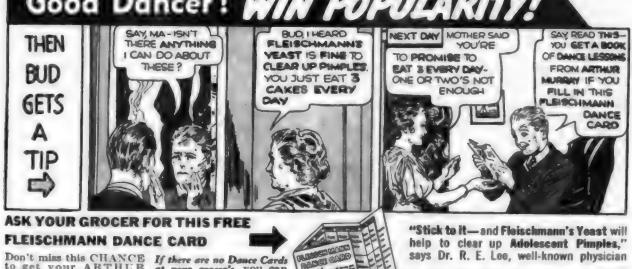

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If there are no Dance Cards at your grocer's, you can still get the book by pasting the 81 yeast labels on a sheet of paper, or putting in an envelope, and mailing with your name and address to Fleischmann's Yeast, 701 Washington St., New York City. (This offer holds good until August 31st, 1937.)

(Details of securing Dance Book differ slightly in states West of Denver and in Canada, see newspapers or ask your local grocer.)

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New York Plans Great Fair

[*Continued from page 87*]

has been completely leveled by steam shovels mining through broken bottles, rusted bathtubs and a rich mould of old garbage and the other ash hills are fast disappearing. The eight steam shovels and four dragline derricks with 70 foot booms keep 100 trucks busy moving a cubic yard of fill every two seconds. Over 300 buildings at the edges of the operations have been razed.

When all this work is completed, this location will be good ground ready for landscaping; the swampy lake will be transformed into fresh water lagoons, a new channel will be dug for the meandering stream, and a dam will be built to keep out the salt water. Ten thousand large shade trees will be set out.

Then will follow the realization of a glorious dream for a world's fair. It is planned that the main core of the fair will be on the northern part of the tract in an area of 373 acres most accessible to the Long Island Railroad and to Flushing Bay.

Since the fair is in celebration of the one hundred and fiftieth anniversary of the inauguration of George Washington, its theme is based on Washington's words in his inaugural address—"Discernment and pursuit of the public good." It is explained: "The theme is the creation of a better and fuller life—and the advancement of human welfare. All that has been learned, or discovered, or fabricated toward this end, in the 150 years since George Washington's first inauguration; all that is good and attainable by individuals and communities; all the goods and ideas thus far developed, will be displayed in a connected sequence, so that, seeing what is available to them, visitors to the Fair may be inspired to work with their fellow citizens for a more worthy future."

Encircling the main core of the fair grounds will be a peripheral road. The central building is the "Theme Tower," to be 250 feet high. This is to be the highest building. All other buildings will be either one or two stories high.

Connected with the central tower will be a "Theme Building" in which a panorama will give the motif of the fair, showing how our present day tools have been developed during the past 150 years and how they are being used to produce a better "world of tomorrow."

From the central tower will radiate broad avenues and promenades leading to the ten main exhibit zones into which the fair will be divided. The ten zones for exhibits of Clothing, Shelter, Education, Government and Co-operation, the Arts, Health, Recreation, Sustenance, Public and Social Services, and the Basic Industries, including Transportation, Communications, and Distribution, will carry out their themes, each in its own way. Each zone will have its own focal point.

Eastward from the Tower is to be a series of

[*Continued on page 124*]

Checking piston-ring widths on extremely accurate dial gage.

Inspecting Ford Pistons for accurate diameter and roundness on quick-reading amplifying type of gage.

Genuine Ford Piston Rings insure a perfect fit in cylinder bores.

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Genuine Ford Pistons are of light-weight cast-alloy steel.

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FORD PRECISION manufacturing, materials that must meet Ford requirements in quality, Ford rigid tests and inspections — standards of a manufacturer genuinely interested in the performance and economy of his cars over the years . . . these make Genuine Ford Parts "Genuine."

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Build "Cloud Hooker"

[*Continued from page 95*]

sheets of the right lengths and cement them edge to edge. When dry cut to shape and cement to rudder. The hole for the stabilizer is cut before the wood is attached to the rudder, and it should be a little small to allow for sanding. A small groove should be made along the bottom of the rudder to fit the top of the body.

The propeller is carved from a block of medium hard balsa 13"x1⅜"x1", which is blanked out as shown in Fig. 5. It is ¼ in. thick tapering to $\frac{1}{16}$ in. at the tips. The free-wheeling device is cemented on with plenty of cement. Any proven device may be used.

First, cover the stabilizer and rudder, making sure the grain of the paper runs in the same direction the ribs do, and using banana liquid as adhesive. Spray the tissue covering with water and allow to dry thoroughly. Dope with two coats of clear dope. If you want a colored model, use colored tissue of a good grade, or use aniline dyes in the spraying water. Cement the rudder in position with the groove fitted over the top longeron. When this is dry, cover the lizer in the hole in the rudder, and cement well in position.

The tail skid is now cemented in position and the bottom sides of the fuselage covered using small sheets of tissue around the skid.

The wing is covered with the grain running in the same direction as in the stabilizer.

The nose and tail blocks are held in position by means of small wire hooks and rubber bands.

The landing gear is held in place by means of rubber bands, too.

Hold the wing in place with heavy rubber bands.

To power the model, use 12 strands of brown rubber, or 10 strands of black rubber.

First test the glide of the model and adjust until a perfect glide is obtained. Then wind the model by hand about 150 turns, and hand-launch it. *If it stalls place a sliver of wood between the nose block and the fuselage at the top, so that the prop points downward slightly and try again.* Keep putting thicker slivers in until it stops stalling and climbs fast; then, using a winder, give it full winds and start running.

At all times keep your eyes on the plane, otherwise it may fly out of sight and become lost. An assistant with a pair of binoculars trained in the direction of the plane's flight will provide ample protection against this.

Always remember, too, that a model plane is a delicate craft and should receive careful handling at all times. An inexpensive overnight vanity box or suitcase fitted with elastic holders provides an excellent carrying case for your model plane, extra rubber motors, winder and other spare parts. This method of carrying will eliminate any danger of breakage and insure your plane being in perfect condition at all times.

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CARTOONISTS' EXCHANGE
Dept. 354 Pleasant Hill, Ohio

Table Tennis Is Fast Game

[*Continued from page 99*]

a flat surface and attach four butt hinges to the center section so that the table can be folded in half when not in use. After smoothing the plywood with number 0 followed by 00 sandpaper apply a primer coat of white paint to the surface of the table. When this has dried apply the green court finish. This can be any good wood paint. Last mark of the court boundaries and paint them in with white enamel.

The net is a manufactured type and attached to posts made of ⅛-inch strap iron which have a single clamp arrangement welded to the bottom so that they can be drawn tight with a wingnut. The net posts are clamped in position directly over the hinged section of the table.

Your finished table will require a stand on which it can be placed since the average table would prove too small to support it. A pair of wooden saw horses cut from 1-inch stock solve the problem. No dimensions are given for these due to the simplicity of their construction. To provide additional support to the tennis table a board 9 ft. by 4 in. by 1 in. can be notched to fit the sawhorse crossarms and mounted in a vertical position. This arrangement will eliminate strain on the hinges.

New York Plans Great Fair

[*Continued from page 120*]

basins and fountains, and at the far end of these will be the Plaza of Governments and the Federal Hall.

The grounds are to be laid out with wide walks and roads, open spaces and recreation areas, and everywhere garden spots, fountains, and tree-shaded benches. The whole plan provides for free circulation and accommodation for huge crowds, as it is expected that 50,000,000 persons will visit the fair during the year.

There will be a "Hall of Nations" to house foreign exhibits. Two of the permanent buildings will be erected by the City of New York and the State of New York. A Planetarium is planned, on the inner dome of which will be a miniature sky studded with stars and planets. Intricate machinery will move these heavens at will, to show how constellations appeared in the heavens a thousand years ago or how they will look a hundred years hence.

One of the principal zones will be that of Transportation and Heavy Industries, to be located south of the Long Island Railroad tracks. Here will be enlarged railway terminals and the Administration Building, which will be one of the first buildings to be erected. Near the Administration Building will be Army and Marine camps.

In the southern part of the grounds two large lagoons are being formed, and at the northern

[*Continued on page 134*]

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● Better steel, better sharpening, better inspections make Treet a better blade. Keener ...it removes your beard smoothly, gently, comfortably. It *stays sharp* for *more* shaves!

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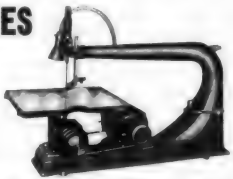
Tools must be engineered to give service. That in itself is sufficient reason for your selecting these 1937 Driver Power Tools. Every new development is preceded by careful study and expert planning to make Driver Power Tools the outstanding values in home workshop equipment—they are Engineered Tools.

Stop in at your nearest Driver dealer's today and convince yourself of their high quality and fine appearance. Or send for a copy of the colorful 1937 folder which illustrates and describes every Driver Engineered Tool in detail.

DRIVER BN725 BAND SAW

$31.50 as shown, including 72-page Instruction Book. Craftsmen who examine this 12" Band Saw wonder how it is possible to sell so much quality for so little money. Guards, ripping guide and table extension are regular equipment. SKF ball bearings throughout. Geared control mechanism for tilting table. Shipping weight 103 lbs. Does all work easily, quickly and smoothly.



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$26.95 (as shown less Motor and Saw Blade) including Flexo Lamp, Belt, Motor Pulley, Two 3-way Electric Outlets and 72-page Instruction Book.

In this streamlined 24" Jig Saw still higher standards of utility, efficiency and value are reached. Throat capacity 24". 16" x 12½" machined table tilts to 45° angle—has graduated quadrant. Positive blower in head. Splash oiling. Ground surfaces on arm and head assure easy action and positive alignment. Shipping weight, less motor, 115 lbs.

Driver Engineered Power Tools include Band Saws, Jig Saws, Bench Saws, Jointers, Motor Grinders, Flexible Shafts—Three Complete Lines in Three Price Ranges.

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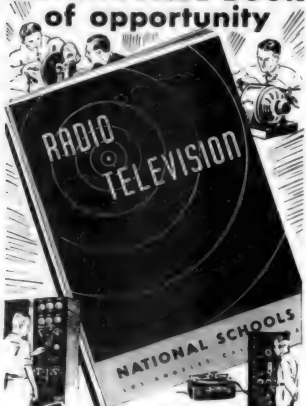

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Written in plain, understandable language, this free Book gives facts you want to know about the best-paying trades and opportunities. 96 illustrations. Major subjects include Television Theory and Construction, Pick-up Systems, Amplifiers, Transmitters, Receivers, Cathode Tubes; Radio in all its branches, Receiving, Broadcasting, Troubleshooting, Construction and Theory; Sound-recording on Discs; Loud Speaker; Talking Picture Projection, Radio Communication, Laws, etc. This book also tells how you can qualify for these good pay trades by training at NATIONAL SCHOOLS. Send coupon now for free book.

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Magic-Makers of the Radio

[*Continued from page 71*]

It is notable that, where a few years ago radio shied away from effects tending toward the gruesome, today there is a pronounced trend toward realism. The emergence of radio drama and the popularity of news features must be credited with the development. A case in point was the radio story of the beheading of criminals in Germany not long ago. No detail was omitted, but the radio audience would have been spared its shudders if it could have been present in the studio to observe that the victims on the block was a mammoth piece of bologna sacrificed to the knife.

In Poe's story "The Tell-Tale Heart," the reader may remember that the criminal who has murdered a man and buried him beneath the floor of his home is finally driven to confess by the obsession that he can hear the dead man's heart thumping accusingly. In the radio presentation, the sound the audience heard was the actual heart-beats of a husky six-footer, amplified through a stethoscope.

Accident is responsible for a number of unique sound effect discoveries. A sound effects technician, making a department store purchase, flexed and unflexed a dollar bill in her hand. To you or me it would sound like a dollar bill being snapped. But to her it was the *put-put-put* of an outboard motor, and so it proved to be when she hastened back to Columbia studios to try it out before the mike. A studio wit suggested that at that rate a ten-dollar bill should be able to reproduce the sound of an entire outboard regatta.

The most satisfactory way to insult a sound effects man is to imply that he uses "canned" effects—phonograph records—because he is unable to reproduce the sounds in question. Forty per cent of all sound effects actually are supplied by records, but the expert maintains that this is merely a matter of expediency. It is a touchy point of pride with him that he can create any sound known to man.

It is perfectly within his capabilities to produce the sound of frying bacon, popping corn, perking coffee, and the like, but it saves time to rely on records for these effects. The well-equipped studio record library contains some 150 discs, carefully indexed. These are made by a special recording studio which makes a business of supplying sound effect records to broadcasting stations all over the country.

The aid of records, however much the true artist may disdain them, is a matter of necessity when one considers that certain script shows (which is the radio description of dramatic plays) are one-third dialogue and two-thirds sound effects.

"Renfrew of the Mounted," the story of a Canadian mounted policeman, holds the record at Columbia for its demands on the sound department. Five men work all day, five days a week, prepar-

[*Continued on page 131*]

New Delta Tools for 1937

More complete than ever before, the Delta line for 1937 includes a full line of wood working and light metal working tools and all necessary accessories and incorporates many new features and improvements and new units. This year the Delta line includes:

A remarkable NEW Belt Sander; Revolutionary NEW 17" Drill Presses; a NEW Precision 4" Jointer; a NEW Precision 11" Drill Press; Improved 14" Drill Presses; Improved Combination Units; NEW Tapping Attachments; NEW Shaper Cutter-head; NEW Tenoning Collars; NEW Belt-Drive Buffer; NEW Belt Guards and Improved Safety Features.

New 17-Inch Drill Press

New Seventeen-Inch Drill Press. The greatest drill press value ever offered. Nothing quite like it on the market today.

Combination Ten-Inch Circular Saw Six-Inch Jointer

Extremely popular combination unit comprising two splendid Delta tools mounted on steel stand. Numerous special features on both tools. No interference. An ideal unit for home workshops and light factory work.

Write for 1937 Catalog

And also the New 32-page book No. 3 of "Practical Delta Projects" crowded with new and "out of the ordinary" things to make—with many photographs, working drawings, and easy-to-understand illustrations. Every craftsman should have this book. Send 10c with coupon for Delta Project Book No. 3. 1937 Delta Catalog mailed postpaid.

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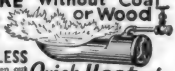
COOK and BAKE Without Coal or Wood



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Beats any oil burner ever gotten out for low cost, perfect performance. Slips into any old stove, range or furnace; burns cheap oil a new way, without pre-generating or clogging up. Intense heat instantly by Simple Turn of Valve.

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30 DAYS' TRIAL
Prove it ends drudgery and dirt of coal or wood; cuts fuel bills in half, pays for itself quickly by what IT SAVES.

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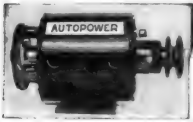

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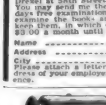

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Name ..... Age .....
Address .....

All-Wave Receiver

[*Continued from page 112*]

when cold draw about 1 ampere, enough to burn out any pilot light that will illuminate the dial when the tubes are hot. If desired, the user may operate pilot lights from a seperate 4½ volt "C" battery, or in series with suitable resistors across the entire line voltage, separate from the heater circuit.

Although the gang switch shown in the pictorial and schematic wiring circuits has only four sections the switch received with your coil kit will have five. The first switching section, unless you intend to use colored pilot lights, is ignored. In wiring up the set follow out the wiring arrangements shown and disregard the first switching section. Later the pilot lights can be wired in if you desire them.

PARTS LIST FOR ALL-WAVE SET

1 Philco 32-1467 or similar Antenna coil
1 Philco 32-1468 or similar Rf coil
1 Philco 32-1469 or similar Oscillator coil
1 Philco 31-1350 or similar Tuning Condenser
1 Philco 27-5064 or similar Dial scale
1 Philco 42-1079 or similar Wave Switch
1 Philco 31-6027 or similar Padder Condenser
3 460 kc. IF transformers
7 6-prong wafer sockets
1 7-prong small wafer socket
1 7-prong large wafer socket
1 5-prong wafer socket
2 7-prong small speaker plugs
1 7-prong large speaker plug
1 500,000 ohm volume control with 2-pole switch
1 50,000 ohm rheostat
5 tube shields
1 10MF 25V electolytic Cond.
1 16MF 150V electolytic Cond.
1 ½MF 200V paper Cond.
1 .01MF 400V paper Cond.
2 .5 meg. ½ watt resistors
3 1 meg. " " "
1 .1 meg. " " "
3 .25 meg. " " "
1 300 ohm " " "
1 400 " " "
1 1000 " " "
1 5000 " " "
1 .0005MF mica Condenser
2 .001 mica Condensers
3 .1 paper Condensers
1 .00025 mica Condenser
1 .002 mica Condenser
1 .006 mica Condenser
1 push-pull input transformer
1 permanent magnet dynamic speaker for p.p.43's
3 Philco 38 6044 shield cans
1 chassis
1 pilot light assembly } optional
1 or 4 pilot lights 6-8V. 15 amps. }
3 6D6 tubes
1 6C6 tube
2 37 tubes
1 75 tube
2 42 tubes (for 6v. set)
2 43 tubes (for 32 & 110v.)

U. S. Buries 6 Billions In Gold

[*Continued from page 79*]

invading foe to crack. Treasury officials point out that, even if the gold was reached, its removal would be a tremendous task. Provided that an invading force could successfully fight its way through the Appalachians, reach the treasure house and rifle its vaults, it would take an army of 120,000 men, each packing 100 pounds

[*Continued on page* **130**]

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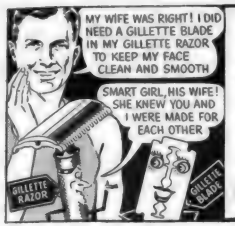

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Comet is 114g in. long, made of highest quality materials throughout. Design principles as used on expensive professional arc welders. Heavy alloy brass Tongs, cool, balanced Wood Handle; Carbon Electrode; 25 ft. of weatherproof, flexible Cable; 25 amp. cap. Battery Clip complete with supply of steel Welding Wire, and clear, easy INSTRUCTIONS.

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The Comet is a real welder—a tool, the same as used by thousands of professional welders. Husky, man-sized. Uses little current—only 20 to 25 amperes—yet quickly brings heat to welding point. Ideal for soldering and brazing. No skill or experience needed.

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The Comet is FULLY GUARANTEED. You take no risks. If you are not positively delighted with the Comet within 15 days the Comet costs you nothing—simply return and every penny paid us will be cheerfully refunded.

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Loose bathroom fixtures
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Loose tiles
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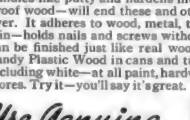
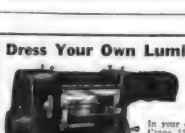
Plastic Wood—the marvelous preparation that handles like putty and hardens into lasting, waterproof wood—will end these and other troubles forever. It adheres to wood, metal, tile, stone, porcelain—holds nails and screws without splitting and can be finished just like real wood. You can get handy Plastic Wood in cans and tubes—in 9 colors including white—at all paint, hardware and variety stores. Try it—you'll say it's great.



Dress Your Own Lumber—Save $ $



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Write for Catalog

BOICE-CRANE CO.
Dept. MX-4M, Toledo, O.

U. S. Buries 6 Billions In Gold

[*Continued from page 128*]

of gold, to remove the 5,714 tons of metal.

Although constructed in the most modern manner, there is a touch of the medieval in the two water-filled moats that encircle the strong box. In addition, the whole is surrounded by an electrified ten-foot steel fence, guarded by sentries 24 hours a day. Concrete pill-boxes, bristling with machine guns, are set at each corner of the building, and a dome on top of the treasure house contains more machine guns as well as powerful searchlights.

Transfer of the gold from unsafe coastal depositories to Fort Knox was no simple matter. Fifty armored trains, each with more than 100 soldiers aboard—with thousands more strung along the route, aided by secret service men and police—moved the nearly six tons of gold from New York, Philadelphia and other cities.

The new fortress-vault at Fort Knox cost $468,000 to build, including the cost of 660 tons of re-enforcing steel and 600 tons of structural steel. Even plus the $100,000 mailing expense, Uncle Sam figures he is getting off cheap.

Building Midget Mike

[*Continued from page 106*]

sand pipes run from the sand dome to the running board following the curve of the boiler and are soldered to the boiler at both ends. Scrape off any excess solder and clean up with emery. The pipe from the air pump to the cab is No. 24 brass wire and is soldered to the firebox. The lower end is set into a small hole in the top of the air pump. The large pipe on the left side is heavy brass wire. Note that this pipe bends out slightly to clear the sand pipes. Solder at both ends.

It is advisable to put a very small brass washer between the main and side rods. File the head of the rear screw thinner as with the front one.

The motor brackets are made from sheet brass and dimensioned according to the plans. As the motors have a slight variance of size in the end brackets it will be best to locate the holes for each individual motor. The approximate location is shown on the plans. Four brass 2-56 screws are used to fasten the brackets to the motor as the holes in the motor frame are drilled No. 50 and tapped 2-56. The gear on the rear axle is secured by filing small flat place on the circumference of the hub and, after marking the spot with a center punch, drill a No. 60 hole through the hub, axle and the other side of the hub. Then run a short length of heavy brass wire through the hole and bend the ends over. The worm comes with a hole drilled but not tapped for a set-screw. Tap this hole 2-56 and use an iron 2-56 screw for a set-screw. As with the crank pins, the screw is a little too long, so file part of the end off until the head nearly touches the hub of the worm when it is set. The worm fits on the motor shaft with the hub end towards the motor.

To fasten the superstructure, consisting of boiler and cab, to the frame, drill a No. 26 hole in the boiler support, down through the cylinder block and piece "B." Drill a No. 35 hole in the bottom of the smokebox and tap 6-32. Now make a screw to hold the boiler down. Thread a 3/8" length of 1/4" brass rod. Cut a slot in one end and put screw in place from the bottom and tighten. Next put on a nut and draw it up tight. The rear is fastened by a clip; the dimensions of which are given in the plans.

Construction is completed on the locomotive proper by soldering thin brass wire around the cab windows and rain guards to produce a beaded effect.

There is still to be constructed the third rail collector, tender and motor reversing switch and of course your locomotive and tender will have to be attractively painted. All of this work will be covered in the concluding installment which will appear next month. In building "Midget Mike" it is very important that you first redraw all plans to actual size. Although all diagrams are true to scale they must first be enlarged to full size. Blueprint plans, actual size, are available now for those who desire to work from actual size diagrams. These can be obtained from the Workshop Editor at $3.00 per set and all orders for blueprints to Modern Mechanix, Fawcett Bldg., Greenwich, Conn.

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Magic-Makers of the Radio

[*Continued from page 126*]

ing the sound effects, rehearsing them, and presenting the show. If the script calls for horses stampeding, they cannot be satisfied by reproducing the beat of hoofs and letting it go at that. Modern technique calls for a sound picture of the entire scene. Thus to the beat of hoofs is added the splash of water as the horses rush through a river, the muffled thud as they reach the sandy shore—the whole panorama must be constructed for the listener.

One persistent story regarding the sound man deserves to be scotched once and for all. You have probably heard it. It goes something like this—the script calls for the sound of someone cracking peanuts. For days the sound department drives itself into a frenzy trying every imaginable means to produce the effect. They snap wood, break lead pencils in half, crackle paper and tear their hair. Finally someone suggests that they try cracking peanuts, and lo!, it is the perfect effect which has so long eluded them!

It is not to be denied that such rejections of the obvious have occasionally occurred, but for the most part they are just good newspaper stories. The first consideration of the sound expert is whether or not the desired effect can be produced by natural means. In a surprising number of cases he goes to great pains and expense to produce the effect in just that way.

The Lux Radio Theatre program called for a pier in the East River with old, worn planks over which a wagon drawn by two horses rolled and rumbled. Out of the well-equipped workshop of the sound department came an actual pier in miniature, which was set up in the studio. Its heavy boards creaked realistically when they ran a real wagon over it. Three men were needed to produce a few seconds' sound-illusion on the air—one to give the sound of hoofs, another to take care of the creaking pier, and a third to manipulate the wagon.

The sound of a compressed-air drill is made by a compressed-air drill. Ten-gallon milk cans delivered from a milk train are actual cans rolled on a platform. The National Cash Register Company supplies a new cash register every month to each of the New York studios for the authentic jingle of this interesting accessory. Typewriters, alarm clocks, and doorbells are present in the flesh. Columbia has fifteen French taxi-horns, each guaranteed to blare an individual bellow. In the "spook" division of the sound department, devoted to the radio interests of ghosts, phantoms, and supernatural menaces, the visitor will observe row upon row of chains, each with its distinctive clank. "Creaks" come in a variety of mechanical assortments. They are made by mounting rusty hinges on wooden frames and by the use of selected woods in varying combination. Thus, upon order, the sound department

[*Continued on page 135*]

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W. P. A. Battles Old Fire

[*Continued from page 76*]

In other places, miners are at present digging coal from workings that are in sight of hillsides spotted with blazing craters.

When visitors to the district express astonishment and uneasiness, however, residents joke about the underground fire which they regard as a spectacle. They say that while there have been a number of narrow escapes, there is not much real danger if one is careful. No one, as far as is known, has been killed although several disappearances have been recorded in past years.

Time after time, the fire has undermined highways, but when a section of some road caves in, the holes are filled with dirt, as was done to the stretch of the New Straitsville–Shawnee highway, and traffic is soon going on as usual.

Oil and gas well derricks being operated within a few feet of smoldering outcropping and active craters is a sight that makes a visitor doubt his own eyes until it is explained that the well holes are protected by three and sometimes four casings, so that it is impossible for the underground fire to ignite the oil or gas. Just the same, not many visitors care to get close to the derricks.

During the past half century fortunes have been spent in efforts to check the flames. Cement walls have been sunk into the earth at what were thought to be strategic points but the intense heat cracked the cement and the fire passed on through it almost as if it had been peanut brittle. On another occasion, the course of a creek was diverted and the water sent down a shaft into a seething cavern. Gases forced up by the weight of the water spewed live coals along the cavern roof and caused the fire to spread more rapidly than ever above the water level.

A short time ago, pupils in a new $80,000 school house near New Straitsville began to complain because the inside of the building was a good deal warmer than the outside atmosphere. An investigation disclosed that the underground fire was within twenty feet of the structure. The children were promptly dismissed and an emergency crew dug through the basement and around the foundation, removed the smoldering coals and saved the building.

The method for putting out the 53-year-old blaze by government engineers calls for three barriers that will enclose the flame swept area of about seven square miles. It is doubtful if the fire within this area can ever be put out and even if it could the cost would probably be too great to be worth the effort, but by confining the fire to this comparatively small area, engineers believe it is possible to save the rest of the extensive Hocking Valley coal deposits.

Two types of barriers are being engineered by Adam Laverty, operations engineer, John Werker, chief engineer, and W. J. Feane, U. S. Bureau of Mines engineer. Where the coal is close to the surface, cuts are made with steam shovels, the procedure being similar to the "stripping" method

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in mining, where the soil is removed and the coal then taken out of deep, wide ditches. After a ditch barrier has been dug and the coal removed to a width that will stop the progress of the fire, the cut is filled with dirt.

The other type of barrier is a tunnel driven through the coal seam and dividing it. To prevent the fire from jumping across the tunnel, holes are driven down to it from the surface and a stream of mud is pumped through the holes until the tunnel fills.

Every safety appliance known to mining engineers is being used to protect the workers who must enter the abandoned, smouldering mines to carry on their duties. They will wear iron headgear and heavy boots and will carry canaries in cages as the tiny birds are very susceptible to gases and indicate their presence by becoming very active long before the gas fumes affect human nostrils.

One of the strangest things about the Hocking Valley fire is that none of the men who started it were ever arrested. Detectives worked on the case for years, but miners who might have been able to reveal the names of the men who ran the torch cars under the hill merely smiled when questioned.

The nearest the mystery ever came to being solved was about a year after the fire started. Albert Guess, a former inmate of the Ohio penitentiary, had returned to the scene of his youth and was working in one of the mines in the Hocking Valley. One day he committed a misdemeanor for which constable Henry Ours started to arrest him on a street in New Straitsville. The ex-convict was in a savage mood and as the constable approached, Guess drew a pistol and began firing. One shot killed the constable while a second killed a boy who had just emerged from a school building across the street.

A mob broke into the jail that night and dragged Guess to a nearby tree. At the last moment, with the noose around his neck, Guess tried to revenge himself on the mob by revealing the name of the men who had started the mine fire. Hoping that someone in the crowd would repeat his words to proper officers, he said, "I know who ran those burning coal cars into the mine and I'm going to tell who did it. The men were—", but that was as far as he got for half a dozen hands tugged on the rope and the tightening noose cut off the ex-convict's breath forever. The mystery still remains unsolved.

For years, mine owners were willing to pay a reward to learn the names of the guilty men, although everyone realized that no jury in the region would have brought in a verdict of guilty. Nowadays, no one wants to uncover information that might cause fresh trouble.

Whether the fox is a useful wild life citizen or a nuisance is a never-settled argument among hunters, farmers, and naturalists, but a recent study of the feeding habits of foxes suggests that B'rer Fox inclines to the useful side.

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New York Plans Great Fair

[*Continued from page 124*]

end of the larger of these is to be an amusement amphitheatre where visitors will be entertained by every variety of show—operas, plays, pageants, water spectacles and fireworks. The stage, flanked by two massive pylons, will be built on a semicircular island 100 feet off shore. Beneath the grandstand will be a large promenade hall and various exhibit rooms.

An attempt will be made to provide new methods of entertainment, new shows such as cannot be found anywhere else. The fair is to be three times as big as Chicago's huge show and much more gorgeous. Buildings, although of a unified design, will be of strange new colors and shapes. Colored lights, strip girls, gondolas and skyrides will be on a lavish scale. Besides the exhibits there will be athletic events, boat racing, swimming races and water sports of all kinds. The amusement section will extend for three miles along the eastern borders of the lagoon and, in addition, entertainment will be provided in the main section of the fair in the ten major zones. And to keep the youngsters from too much footsore sightseeing, a playground will be centrally located near the Government Plaza.

Instead of one main entrance there will be nine, located to facilitate handling the crowds and to shorten the distance to transportation lines. From the entrances broad avenues will converge on the central Tower.

The grounds will be served by every means of transportation. Two major highways traverse the tract, one along the bay, the other through the center. Another highway runs along the west side, another at the southern end. A division of the Long Island Railroad crosses the tract, and the main line touches the southern end.

Two subways already have stations on the grounds, and a spur from a third subway will enter the grounds from the south. Flushing Bay will be dredged for water craft. As a part of the increased transportation facilities, the improvement of this bay is ranked among the most important as an ideal water gateway to the fair. If a deep enough channel can be provided, ocean liners will dock right at the gate. There will be a boat basin and planes may come down there, or land at nearby airports. Parking space for 30,000 automobiles daily will be provided, and bus terminals will be able to care for 50,000 passengers. There is also to be a trailer camp, to take care of thousands on homes on wheels.

The New York World's Fair will open its gates on April 30, 1939, and after its grounds have served the purposes of the fair, New York City will get a new and beautiful park with groves and gardens and such basic improvements as roads, bridges, sewers, lights, and some permanent buildings.

Meanwhile, work goes on to provide amusement, thrills and a glimpse of things you never even thought of before.

Magic-Makers of the Radio

[*Continued from page 131*]

will deliver a hesitant modest creak, appropriate to a wandering lady ghost, or a spine-chilling crepitation suggestive of Dracula at his worst.

Crockery mortality in the network studios is appalling. Both NBC and CBS buy dishes by the barrel and break them recklessly, not only in domestic dramas but for general crash purposes as well. A gross of platters dropped from a six-foot elevation can be almost anything from a landslide to a train wreck.

Indispensable, too, are small fruit boxes of the type used to pack strawberries. The brittle wood, crushed before the microphone, can be the crackling of a forest fire, the destruction of colliding automobiles (plus shattered dishes for crackling glass), and has even been used to simulate the breaking of a human neck and other emergency purposes.

These stock items, plus the record-playing machine, a collection of doors of all kinds for slamming purposes, and a rain and wind machine are standard equipment in every well-equipped studio. Ray Kelly is the inventor of a new rain machine which can reproduce every pluvial variation, from an April drizzle to a China Seas typhoon.

As a gadget it suggests a Rube Goldberg contraption at its most fantastic. Grape seeds, marbles, a ping pong ball, cellophane and peanut bags are the amazing ingredients assembled by the Kelly genius to produce radio rainfall and nothing else. The grape seeds are the raindrops; they are distributed on a revolving disc and scraped off by a windshield wiper, directing them in a falling stream upon a marble a foot below the disc. Some of the seeds bounce off the marble and strike a suspended ping pong ball, dropping upon a sheet of cellophane and tumbling down it to beat upon a glazed bag which originally contained salted peanuts. The rest of the seeds pepper a tightly stretched bit of onion-skin paper.

A tornado is air escaping from a rubber balloon. Marching soldiers are wooden pegs strung loosely in a frame so that they may beat upon a sounding board in irregular rhythm. A whirring factory is a series of gears driven by an electric motor. An airplane engine is a rubber strip whirled on a motor shaft.

But no single one of these devices is so self-important as it used to be not very long ago. Today they are simply the elements out of which the expert builds his composite sound picture. That is the new radio technique.

A vine from Japan called kudzu is proving useful in this country not only as a forage crop but also to "rope land down" and check the gullying of soil.

Coolies are still the mainstays of transportation in many parts of China.

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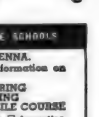

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Edison's Insomnia Squad

[*Continued from page 52*]

more of the substance to test. Again I reported that it was not benzidine. A third time I was given some substance all wet as though freshly prepared. I dried it and found it was benzidine. When I reported this to "Tommy," he laughed and said, "Yes, I know that the last stuff I gave you was benzidine, because I myself bought it in Germany. I just wanted to find out if you knew what you were talking about."

One morning Mr. Edison assigned a new problem to me. He happened to see me in the library building that evening and asked me if I had any results. My reply was that I was getting my supplies together. Then he proceeded to give me a lecture as follows:

"I would like to have you learn my way of experimenting. Do your preliminary experiments in the crudest kind of a way immediately that you have an idea. Don't wait for two weeks until you have everything arranged just so—meanwhile you lose interest in your work. I have assigned something to you. Start right away."

It was 11 o'clock at night but I went into the laboratory and started my experiments. The "old boy" was right; I had some good results before I went home the next morning at 4 a. m.

I copy from my notes, made at the time, some of the things Mr. Edison told me:

"The place for a fellow to start to learn chemistry is at the sink. Next he will graduate to shaking bottles of solutions."

"Formerly I imported chemists from Germany. I stopped because my experience was that the German chemists generally were familiar with only one subject and not nearly as versatile as American chemists."

"Let nature speak for herself; just watch her. I have had 50 experiments on one table and 50 on another all going at the same time and have completed as many as 700 in one day. As a result I have never yet failed to find something suitable for the purpose desired."

"People who write books have no time to experiment. Many of them write only what they read. Make experiments first and theorize afterward. College professors may have theories, but I have the facts. The reason I know things will work a certain way is that I have tried them and seen them work."

"Say things in a few words; if others don't believe what you say or write, let them try it, for that is just what I had to do. Remember that genius is 99 per cent perspiration and only one per cent inspiration."

I was warned to beware of "black goo"—the black residue left after phenol manufacture in the stills, to the extent of about 100 pounds daily. I was informed that several experimenters had been discharged for failure to find out what it was.

Imagine my horror when one night Mr. Edison walked in followed by a laborer carrying

a 50-pound box of black goo and asked me to identify it as he thought it was valuable. I worried and worked for 10 days and nights. Maybe you don't know what a vacuum distillation is, and don't want to know, but it was my salvation and brought me a substantial increase in salary.

Mr. Edison was not entirely deaf and could hear if we talked into his right ear. He was happy when his wife joined the Red Cross so that she had less time to look after him and lavish her kindness on him or else, as he regarded it, less time to interfere with his experiments. He called my slide rule a "guessing stick." He set up a mechanical stirrer to take the place of stirring solutions by hand and then remarked to me contentedly, "Now I have nature harnessed by the backside."

Mr. Edison wore one suit constantly until it wore out or had too many acid holes in it and then had the tailor send him another. Mrs. Edison was happy when anyone could persuade Mr. Edison to wear a laboratory coat to protect his clothes.

When apparatus of any kind was needed by Mr. Edison or his assistants, the laboratory force was not at all particular how it was secured. On one occasion the oil stove belonging to the gateman was appropriated to be converted into an apparatus for making lampblack. It may seem strange to some that on one occasion the laboratory of the wizard who gave birth to the electric light bulb actually ran short of them. But that is just what happened. Informed of the shortage of electric light bulbs for experiments, he gave the following order, "Go out and swipe some anywhere in the plant."

The chief engineer came into the laboratory on the day that President Woodrow Wilson was to make an address at Shadow Lawn, New Jersey. Mr. Edison had previously announced his approval of President Wilson. "Mr. ——— wants to know if you are going to Shadow Lawn this afternoon," said the engineer. "To hell with Shadow Lawn," was the vigorous reply. "You know there are a thousand other things I want to do."

Some of Mr. Edison's terms to his workers, including myself, depending on conditions and his mood were "My dear boy—" "Damn fool!" "You're off your nut." But he was busy and intensely human.

The four-hours-of-sleep-per-day-or-night legend had a basis but the four hours were four hours at one stretch and did not include the dozens of catnaps taken during the day. The experimenters had to keep on working as they could never tell when he would suddenly open his eyes and be wide awake. The transition was rapid.

One of the things Mr. Edison disliked intensely was riding in a closed automobile. He used to say it made him feel as though he were locked up in a closet and unable to get out.

In spite of Mr. Edison's inventive genius and

[*Continued on page* 138]

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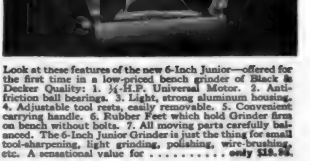

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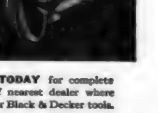

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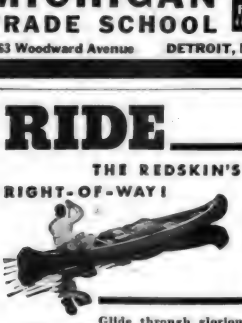

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"Old Town Canoes"

Edison's Insomnia Squad

[*Continued from page 137*]

genius at getting his employees to exert maximum effort he drove his business associates frantic with some policies. This was almost disastrous, and as a result he was sometimes pinched for money.

Lest this statement be challenged, I will give an example which occurred in the phonograph record industry. Mr. Edison disliked jazz records and many forms of popular comedy records and ruled them out. Instead he prescribed opera music but would not permit the names of the stars on the records. Stars are temperamental, and they signed up on exclusive long time contracts with competing companies. As a result the Edison records were not selling at all well and by the time that Edison tried to sign up the stars, only the second raters were left.

My last assigned problem in the Edison Laboratory, after 10 months of experience, was Mr. Edison's order to make material for smoke screens for aeroplanes in a certain explicit manner. Foolishly I disobeyed orders and substituted another method which I thought was preferable. When Mr. Edison discovered this he was furious and told me so in no uncertain terms. A short while later the paymaster visited me—although it was not pay-day—and gave me a dividend of two weeks' extra pay and the usual one hour to leave the premises. A few days later the U. S. Navy gained another recruit.

In closing I should like to give an example of how work and desire for results was the irresistible driving force which spurred this genius onward to constant efforts. Once when Mr. Edison was exasperated, I was incautious enough to ask him what to use in a certain experiment. His characteristic reply was: "It's results I'm after. Use mud if you have to."

Most Boys Born In April-July

If it's a boy you want, Fond Parents, plan his birth date for some time between April and July.

American birth statistics support the view that conception occurring from July to September is "favorable to increased masculinity."

English investigators find that rural areas produce more boy babies than do the cities, and from statistics available in the United States the same seems to be true here.

Social upheavals seem to bring more boy babies. During the World War and immediately thereafter, the ratio of male births increased in the war countries. Neutral nations experienced the same phenomenon but not to such an appreciable degree.

In England and Wales the upper classes give birth to more boys in proportion than do the lower classes. In Greece the masculinity of births is exceptionally high. In Japan and Italy it is low.

Would Create Sea In Africa

That Chancellor Adolf Hitler's recent demands for a German colonial empire in Africa may have other aspects besides the expressed desire for land where raw materials can be grown, is seen in an engineering proposal for a "Great Lakes" in Africa.

The three proposed inland seas in the heart of the Dark Continent would, it is believed, turn barren lands into fertile, arable soil and make accessible areas now remote.

As much as anything, the proposal is advanced to supply an outlet for the crowded European populations that may otherwise butcher each other in futile, profitless wars.

Hermann Soergel, a Munich architect, is the originator of the Great-Lakes-in-Africa plan.

A single great dam only two and one-half miles long would create the northern pair of African Great Lakes, says Herr Soergel. This dam, thrown across the Congo River at a narrow spot in its outlet valley, would back the 60- to 80-inch annual rainfall of the equatorial African region into the low-lying Congo basin, which in past ages was a tremendous inland sea. This ancient sea would be re-created, with an area of nearly 350,000 square miles, or nearly four times the combined area of all the American Great Lakes.

This "Congo Sea" could be formed alone, and the surplus water permitted to drain down the present Congo River channel—of course with the generation of considerable water power. Or, an outlet could be arranged toward the north, and the water used to create a second inland sea of about the same size, centered around the present Lake Chad. This sea would extend far up into the Sahara, as far as the Ahaggar region.

From the projected "Chad Sea" the drainage would be toward the Mediterranean, taking advantage of dry river channels, or "wadys" in the desert. The "second Nile" thus formed would flow first west, then northerly, and finally almost due east through the French colony of Tunis into the Gulf of Gabes. Through most of the northern part of its course it would flow through land capable of irrigation.

To carry out this scheme, a high degree of international co-operation would be necessary, for Belgium, French and British territory is involved, plus possibly Italian lands in Libya for which irrigation water might be provided. Herr Soergel, interested mainly in the engineering and geographical aspects of his proposal, simply assumes that these one-time allies in war might be able to arrange a more lasting and profitable alliance for the purpose of peace.

The third of the African Great Lakes could be "all British," and would in any event have no connection with the other two. It could be created by a suitable dam above the Victoria falls on the Zambezi River in Rhodesia, and the "Victoria Sea" would back up into part of what is now the Kalahari desert.

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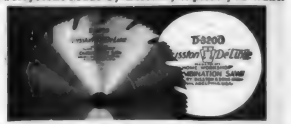

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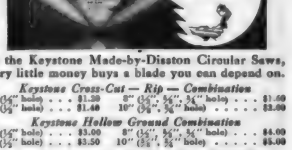

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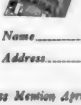

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Final Work On MM Home

[*Continued from page 45*]

"Only one thing," cautioned Bill, "when you come to planting the grass, there are several methods, but the surest and best way is to plant your lawn space first with rye, and after it is fairly well started then sow the space with lawn seeds, after this is fully grown, turn the entire lawn under and replant it in the same manner, using manure to insure a rich lawn. Of course, you can go further as the Japanese do, and turn it under and replant the lawn for the third time."

"Phew," exclaimed Tom. "Twice will be enough for me."

The Leonia house was constructed as a means of showing the possibility, even in a market of rising material prices, for a couple of average income to build their own home with the aid of the government loan plan now in operation through the banks and building and loan associations of the country.

After the contracts for the construction of the house were signed, contact was made with the Federal Housing Administration at Newark, New Jersey, through Miles Colean of the Federal Housing Administration at Washington. Charles Cole of the Newark office turned the writer over to J. J. O'Brien, who was most helpful and obliging in conducting the way through the preparation of the paper work so necessary as a record for an organization such as the F. H. A.

While all the requirements are carefully enumerated, there is a simplicity of form that makes this step easy to accomplish. After this the editor and business manager of Modern Mechanix together with the writer went to the Passaic National Bank and Trust Company of Passaic, New Jersey and applied for the loan. The bank agreed to make a loan of 80 per cent of the total cost for a period of 20 years. Under this arrangement the amount borrowed from the bank was $3,200. Monthly charges for principal and interest are $21.12; for mortgage insurance, $1.93; for bank servicing charges, $2.03, and $1.00 for fire insurance, making a total of $25.08 to carry the house with the exception of taxes, which will amount to approximately $15, or a complete carrying charge every month of $40.08 for a period of 20 years. However, it is to be noted that this cost becomes less after a certain length of time as the principal is reduced.

Most assuredly this is an extremely reasonable and simple way to save money while enjoying one's home at the same time. The writer knows of no place that the amount of the rent paid could compare with the prices arrived at by the above simple method. Think of paying your rent to yourself, and at the end of 20 years having a tangible piece of land and a house free and clear. After that period the taxes would be all that one would need set aside monthly to be assured of a permanent roof over one's head, and a sense of security for the balance of one's life. The Government and the banks are now co-operating to help

Accept No Substitutes! Always Insist on the Advertised Brand!

you accomplish just what Tom did, and Modern Mechanix has stepped into this problem with a definite demonstration of what can be done for a certain sum of money.

Cement was that of the Penn. Dixie Portland Company; the cinder blocks were made by the Faber Cement Block Company of Ridgewood, New Jersey; the rough lumber and flooring were bought from the Glen Rock Supply Company of Glen Rock, New Jersey, while the stock frames, sash and trim were purchased from the General Woodcraft Company of North Bergen, New Jersey. The lime and plaster came from the Certain-teed Products Corporation. All plumbing fixtures are from the Standard Plumbing Fixture Company, and the plumbing supplies from the County Plumbing Supply Company of Hackensack, New Jersey. The boiler for heating and the radiators are the products of the American Radiator Company. The copper work and flashing are the Anaconda Copper and Brass Corporation's material. The insulation is made by the Celotex Company, and the kitchen cabinets were bought from the Highgrade Kitchen Cabinet Company of Brooklyn.

Rebuilds Chemical Of Light

Visual purple, a chemical compound in the eye, and necessary for seeing, has been made to rebuild itself in a test tube under controlled experimental conditions, in the laboratory of Prof. Selig Hecht, of Columbia University, New York.

This is the first time that the process has taken place under fully controlled conditions, which makes its repetition possible. It is the first time since 1878 that visual purple has been regenerated at all, although many physiologists have tried without success to repeat the experiment of Dr. W. Kuhne of Heidelberg University, who in that year reported having accomplished this very exciting bio-chemical feat.

Visual purple is a pinkish-purple pigment or dyestuff of involved chemical composition, found in the rod-cells of the retina, or light-sensitive layer of the eye. Both in the living eye, and when chemically extracted into a glass vessel, it loses its color when illuminated, first turning yellow and then completely colorless.

In the glass vessel, it has never been turned back to its original color again, except in the 1878 experiment of Dr. Kuhne. But in the living eye the reaction is reversible, that is, if the light is shut off the visual purple forms itself anew from the colorless product of its photochemical breakdown.

Physiologists regard the success of Prof. Hecht and his associates in reversing the bleaching of visual purple at will as a very substantial forward step toward the ultimate understanding of the process of seeing, because it is now possible to perform controlled experiments in one very vital part of that process.

Visual purple for the research was obtained from the eyes of frogs.

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This is the gospel of Dr. Edison Pettit, of the Carnegie Institution's Mount Wilson Observatory in California.

Dr. Pettit, as an astronomer, does not give much encouragement to those who believe that direct utilization of sunlight will solve the world's power puzzle, once the supplies of oil and coal are exhausted. He says:

"This will not greatly aid the problem of transportation directly, as only one horse-power is available per square yard, at 100 per cent efficiency, or one horse-power for each eight square yards, with the ordinary steam engine. For this, a highly efficient form of power storage, like the battery but without its great mass, must be found.

"I must add that no sensible progress has been made in these vital problems, but within 50 years they must be solved.

"The present rate of gasoline consumption by motor vehicles in the United States is equivalent to all the solar radiation available in 100 square miles of the most cloudless deserts. It will be a great engineering undertaking to convert this much solar energy into a form available to the motor car after oil disappears from the earth."

Nor does Dr. Pettit anticipate a full solution for the problem from the proposed use of alcohol as a power fuel, which is in effect a proposal to live from hand to mouth, on the current contributions of solar radiation, after we have stripped the cupboard of the stored sunlight of past geologic ages.

"If we consider the alternative of alcohol as a substitute for gasoline, aside from engineering difficulties of its application, there is not enough arable land in the United States to raise the crops necessary to manufacture the annual supply required. A simple calculation shows that the entire grain crop of a half million square miles, or the annual crop of nearly the entire grain belt in this country, would be involved in this agricultural project alone. It might be carried out in the tropics, where sugar-bearing plants and a fertile soil would facilitate the process.

"It appears that the tropics will become increasingly important in the future economic development of the world. The valleys of the Amazon, the Orinoco, and the Parana, now chiefly inhabited by the most primitive of peoples, will rival the present industrial importance of the valleys of the Mississippi, the Yangtze, and the Nile."

It has been estimated that buying gasoline at an automobile service station takes only half the usual time, with the installation of metered pumps that compute amount and price of the sale.

Accept No Substitutes! Always Insist on the Advertised Brand!

Dixie Dugan's Fathers

[*Continued from page 57*]

which was the reigning favorite a decade ago, there has come the serial story told in pictures—a story of adventure, family life, or romance in which the leading characters pass through a succession of incidents just as they would in a fiction serial. The team of Striebel and McEvoy has been a leader in this transformation.

"Dixie Dugan" is a typical human interest strip which is the product of two specialists. John Striebel is the artist; J. P. McEvoy is the creator of the characters. Dixie Dugan, the heroine who gives the strip its name, is a modern, attractive working girl whose adventures and tribulations with Pa and Ma Dugan, her girl pal, Mickey, and her various boy friends run the gamut of human interest. McEvoy is a skillful storyteller, Striebel an accomplished artist, and the successful merging of their two types of genius has set a pattern which can be observed in numerous other writer-artist teams prominent in the strip cartoon field.

The collaboration of Striebel and McEvoy did not begin until some years after their Notre Dame friendship. Striebel went to Chicago when he finished college and entered the game of fashion drawing and advertising illustration. McEvoy, too, was in Chicago working as a newspaper columnist. When the Chicago Tribune asked McEvoy to originate a Sunday feature, he proposed that John Striebel illustrate it. The feature was "The Potters," which rose to phenomenal national popularity. That was the beginning of the team of Striebel and McEvoy.

Artist Striebel was doing other work at the same time, including magazine covers and the drawings for Robert Quillen's syndicated feature, "Aunt Het." The desire to do a comic strip had always been in the back of his mind. This was quite natural, for there is no surer and swifter road to the big money for a cartoonist than through the medium of a syndicated strip, with scores of newspapers throughout the country buying reproduction rights. Striebel originated a strip which he called "Pantomime" and it ran successfully for six years.

During this period he moved to Woodstock, New York, well known as an artists' colony, to study painting. Thousands of Dixie Dugan fans will recognize Woodstock as the town of "Stoodwock" which occasionally figures in the drawings. While carrying on his Pantomime strip, Striebel was also illustrating a serial called "Show Girl" which McEvoy was contributing to a national magazine.

It is typical of the modern trend in strip cartooning that Dixie Dugan should have been born out of a magazine serial. The idea for the strip grew out of the Show Girl heroine, and it is the serial *story*, pictorially presented, which explains the appeal of the Dixie Dugan strip. It is this same appeal which underlies the success of the

[*Continued on page* 144]

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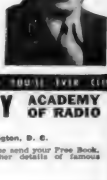

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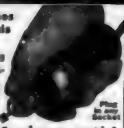

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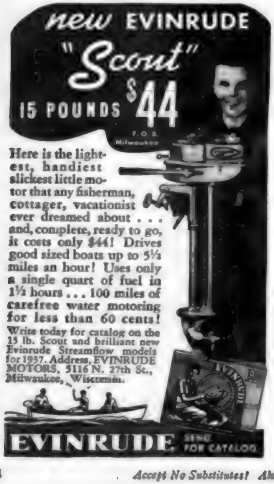

EVINRUDE SEND FOR CATALOG

Dixie Dugan's Fathers

[*Continued from page 143*]

vast majority of present-day cartoon strips, and the artist with a lively fictional imagination as well as a facile pen is ideally equipped for an assault on the field. Few professions offer swifter or more lavish rewards. A yearly contract of $100,000 is by no means exceptional for the man who can create a pen-and-ink character such as Andy Gump, by the late Sidney Smith.

John Striebel reminds one of Douglas Fairbanks in appearance, and he has a genial, observant eye for the foibles of humanity which is reflected in the Dixie Dugan strip. Not all cartoonists are accomplished artists in other media than pen and ink, nor does the profession demand that they should be, but Striebel is an expert in oils and water colors and a great many of his paintings have been reproduced as magazine covers.

Having begun his career at the age of fourteen, he looks up from Dixie Dugan on his drawing board and says whimsically, "Now I'm experimenting with the popular idea that life begins at forty."

Invisible Silver Makes Image

Every time you take a snapshot on your camera at home millions of things happen. Why? Because billions of tiny crystals of light-sensitive silver bromide on the gelatin surface of the film in your camera change when the light strikes them. Those little crystals are embedded in a gelatin layer, like fruit in some of the popular gelatin desserts on the family table.

Developing the film changes the particles struck by the light rays into black metallic silver. It is the gradation from pure black, through the various shades of grays to pure white which produces the shade tones of the final printed picture.

Take a microscope, however, and go into the Lilliputian land of the silver grains you cannot see but which make the images that you can, and there you will find that truly the myriad host of particles is present.

How big are the silver-bromide particles that do this super-human job? Some of them are so small that only the most powerful microscopes will show them. Others loom large under a microscope and may be as big as one six-thousandth of an inch across!

For some of the extra fast super-sensitive films for use in the new candid camera, the grain size is still smaller so that more enlargement will be permissible before the grain structure is noticeable.

In positive film for projecting motion pictures where the enlargement is even greater the grain size is much less than one twenty-thousandth of an inch.

Anywhere from half a billion to five billion particles are embedded in the gelatin on a square inch of surface.

Digging Up India's Past

American archaeologists have unearthed a buried city in India, showing more vividly than ever before what the most ancient civilization of India was like.

The ruins, found under mounds of earth at Chanhu-daro, northwestern India, date back 5,000 years in their oldest era. The modern world can find much to wonder at, in ruins and relics of the dead city.

Chanhu-daro had homes of burnt brick, and the brick was just about like modern brick in size. The houses had bathrooms and drains that are pronounced superior to the sanitary arrangements in cities of other civilizations of their time. The people were industrious at many lines of skilled labor. They made toys for children of cities around the country. They were workers in bronze and copper. They turned out quantities of beads, making some so tiny that forty to an inch could be strung, and boring holes so fine that nothing coarser than a hair would thread them.

As Chanhu-daro was on a trade route, the goods of the city were dispatched by ox-load or pedler's pack to other, distant cities.

The picture of a trade town of ancient India, as old as the famous ruined city of Mohenjo-daro, is the result of excavation by two institutions, the Boston Museum of Fine Arts and the American School of Indic and Iranian Studies. It is only within three years that the Indian government has changed its law, to permit outside universities and archaeological organizations to dig in this region.

The Indus Valley, where Chanhu-daro stood, had its trouble with floods, like Ur of the Chaldees and many another ancient town. The field director of the expedition, Ernest Mackay, finds that at least three great floods attacked the city. After such a flood, the people were forced to leave the place entirely, and in some sequences of the city's history debris piled over the abandoned ruins before settlers came to rebuild.

After the Harappa culture, as the oldest civilization at this site is named, there followed a people of about 2000 B. C. who lived in matting houses, and had only rough paving under their feet. These people made great quantities of pottery which the archaeologists hope will shed more light on the migrations and trade relations of their era.

Chanhu-daro seems to have had its greatest importance early. The later settlements shrunk. Last on the site were a few primitive folk who made dark gray pottery and marked it with geometric designs. This curious ware is unfamiliar even to archaeologists well acquainted with the clay styles of the past. Wandering gypsy-like tribes may have been the last industrialists in the once-flourishing trade city.

The word perfume means "smoke through," an idea from the time when perfumes were commonly used in incense form.

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TRUE *Adventure* TALES

Ships That Vanish

[*Continued from page* 39]

a cargo of manganese ore for Norfolk and was never seen again. She carried 57 passengers and a crew of 221.

As there had been no bad weather reported in the vicinity and the *Cyclops* carried full radio equipment, it was at first believed that a sudden submarine attack had destroyed the collier. The end of the war, however, revealed that no German submarine had been so far abroad at the time. Since then there have been strange tales reported in floating bottles and rumors of bombs in the cargo but no bit of wreckage has ever been found. As the collier carried six heavy steel derricks aloft, the more logical explanation seemed to be that a sudden shifting of cargo, possibly because of a tidal wave, caused the *Cyclops* to overturn.

Since the World War, a number of ships have vanished into the unknown. The disappearance of the five-masted auxiliary training ship *Kobenhaven* threw the entire nation of Denmark into mourning. This vessel, described as the largest sailing ship in the world at the time, carried wireless, auxiliary engines, ample boats and a crew which included several naval cadets from the most prominent Danish families. The boat left Montevideo on December 14, 1929, for Melbourne, Australia, and failed to arrive.

A month later, Philip Lindsay, a missionary on the lonely island of Tristan de Cunha, saw a big sailing ship in distress, with the stern awash and drifting helplessly toward the inaccessible rocks of the island. This prompted A. J. Villiers, the English journalist, to advance the theory that the ill-fated *Kobenhaven* struck ice in the South Atlantic and was abandoned. Though relatives of the cadets combed the sea graveyards of the world, no definite clue to their fate was found.

Ice also has been suggested as an explanation for the disappearance of the *Joseph Medill*, largest all-welded vessel in the world, on her maiden voyage from Newcastle-on-Tyne to Montreal in 1935. As the 2,087-ton freighter was designed to carry wood pulp for the *Chicago Tribune* on the Great Lakes no radio equipment was carried. With a cargo of coal for ballast, Capt. James Macintosh and a crew of sixteen started across the Atlantic on Aug. 10 by the northerly route.

The east-bound Norwegian steamer *Stavangerfjord* reported the *Medill* in mid-Atlantic on Aug. 17. Officers of the S. S. *Duchess of Bedford* saw a lake type vessel ten miles away the next day. On Aug. 20, a storm swept part of the North Atlantic with a wind velocity of 90 miles an hour according to the S. S. *Kingswood* which arrived in Montreal Aug. 31, the day the *Medill* was due.

When the freighter failed to arrive on schedule, all vessels were asked to keep a lookout for wreckage. Patrol boats were dispatched from Newfoundland. The *Chicago Tribune* chartered

[*Continued on page* 148]

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Ships That Vanish

[*Continued from page 147*]

the schooner *Marie Yvonne* which spent twelve days in a zig-zag search of 2,000 miles between the regular ship lanes. Nothing was found. Some believe the freighter struck a fog-shrouded iceberg. Others blame the hurricane. Her sister-ship, of exactly the same construction, successfully weathered the same trip in stormy weather.

Four steel British ships of over 1,000 tons have vanished into the unknown in the past two years. The *Sheaf Brook*, 2,179 tons, sent a wireless call for help in November, 1935, while enroute from England to Hamburg with coal, and disappeared without trace. The *Vardulia*, 5,735 tons, enroute from Hartlepool to Botwood with coal, sent out calls for help Oct. 19, 1935, reporting a dangerous list and abandoning ship. An extensive search revealed no trace. The *Blairgowrie*, 3,259 tons, vanished after being reported Feb. 26, 1935, in Lat. 48.20 N. and Long. 27.1 W. on a voyage from Swansea to Boston with anthracite coal. Loaded with crude oil, the *La Crescenta* became a mystery after being spoken Dec. 6, 1935, enroute from San Luis, Cal., to Osaka.

Since 1935 similar fates have overtaken the Japanese steamers *Unnan Maru* and *Yeiryo Maru* and the Chinese steamers *Tung Foo* and *Paringa*. The Norwegian steamer *Spec*, 2,053 tons, has not been heard of since sailing from Glasgow Feb. 14, 1935, with coal for Boston. The Norwegian steamer *Lysaker III* vanished same month enroute from Rekefjord to Rotterdam with a cargo of iron ore. The Russian steamer *Donetz*, 1,710 tons, has not been reported since leaving Leningrad Dec. 29, 1935, with grain for Rotterdam.

The recent death of the Rev. Justin Moore, a Catholic missionary in China, recalled a sea tragedy as mysterious in some respects as any. In 1923, when he was twenty years old, Mr. Moore was radio operator on the *Swift Star*, a 8,206-ton tanker tied up at Hoboken for repairs. While waiting, he found a friend, also an operator, starving with a wife and family. Mr. Moore resigned in favor of the married man.

On the next return trip, the *Swift Star* disappeared with all hands somewhere between the Panama Canal and Fall River, Mass. Her wireless suddenly went dead while reporting her position. Off the coast of Santo Domingo Capt. F. J. Follett of the schooner *Albert H. Willis* found a battered lifeboat of the *Swift Star*. The charred body of a man wedged in a box was floating nearby. The sea was covered with oil. Captain Follett believed the tanker had been exploded by lightning. Radio operator Moore, who but for his kindness would have been aboard, became a Catholic priest.

Whenever sea mysteries are discussed it is usual to raise the old, well-whiskered story of the *Marie Celeste*, dramatically found with no one on board, all sails set, food in the galley, a meal on the table, and a piano in the captain's cabin with a sheet of

[*Continued on page 150*]

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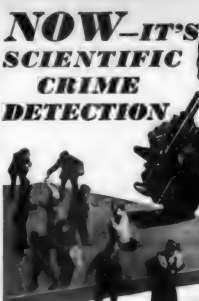

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Ships That Vanish

[*Continued from page* 148]

music on the rack. It has been my job to go into the case of the *Mary Celeste*, as she is called in the records of the New York Pilot Office. The real facts are simple and available to anyone who desires them. It is the standard sea mystery of the age, but has been made so by romantic writers and some of the biggest liars who ever shipped in the forecastle of a ship.

In the first place, when the *Dei Gratia* found the *Mary Celeste* a boat was missing, the log had not been written up for eleven days and the "piano" was a small harmonium such as skippers often carried to pass the long days at sea. The chronometer and sextant were missing, but the captain's cash box was untouched. The *Dei Gratia* put its mate aboard of her and led the way into Gibraltar, where Her Majesty's Attorney General held a survey and inquiry.

The number of theories to explain why the captain and crew of the *Mary Celeste* abandoned her, run to a score or more. It is forgotten or not known by many that she had a cargo of alcohol for Genoa. The alcohol was in barrels and the weather was hot. The captain had his wife and child on board. An extremely volatile liquid like alcohol probably burst a barrel head and alarmed the captain. With his family on board he probably ordered out the boat and decided to stand off for a while, intending to return if nothing further happened. He was unable to get back to her and they were cast away in heavy weather on the coast of the Azores.

Those who laugh at this explanation are invited to find a better one and to stick to recorded facts. Alcohol evaporates and leaves no sign. Alcohol was not understood then as it is now. Admitting that there are holes in my theory it holds much more water than the fantastic rubbish many people have invented about a phantom ship called the *Marie Celeste*.

Time solves some riddles of the sea. In the early months of the World War, while searching for the German raider *Dresden*, the British cruiser *Glasgow* found, in a lonely Tierra del Fuego creek, the wreck of a Nova Scotian bark which had been missing for fifty years. Skeletons of the crew lay about the rotting decks of the wooden vessel. For forty years the fate of the French exploring expedition commanded by La Perouse was a mystery of the Pacific. Finally a British ship found parts of the vessels on Vanikoro Island where most of the French had been drowned or massacred.

Other secrets the sea keeps. The fate of beautiful Theodosia Burr, daughter of Aaron Burr, vice president of the United States, and wife of a governor of South Carolina, is as much a mystery today as when the schooner *Patriot* vanished with her after leaving Charleston Dec. 30, 1812. Various dying seamen have been said to have confessed that they were members of a pirate crew that

[*Continued on page* 152]

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Ships That Vanish

[*Continued from page 150*]

captured the ship and carried Theodosia away. It is more logical to believe that the schooner went down in a violent storm.

The middle of the 19th century was marked by the disappearance of several vessels with hundreds aboard. The *City of Glasgow* vanished after leaving Liverpool, in March, 1854, for Philadelphia with 450 passengers. The ship was one of the first iron steamers and the loss of life for a ship that simply disappeared is a record. The steamer *Pacific* of the Collins line vanished in 1856 with 288 aboard and on Feb. 26, 1857, the Anchor liner *Tempest* sailed into the unknown with 150 on board.

Nowadays only small ships leave port and vanish without a word or after a call for help. There was the case of the *Miramar*, the cruising houseboat of E. M. Statler, the hotel man. With Capt. Thomas Farrington and a crew of 11 aboard, the vessel left Charleston, S. C., Nov. 30, 1925, for Palm Beach and did not arrive.

Thirty-six destroyers failed to find a trace of the U. S. Naval Tug *Conestoga* and her crew of 43 after she left San Francisco March 21, 1921, for Guam, and the freighter *Gilda Scudari*, with a cargo of scrap iron loaded at Houston, Tex., vanished into the Pacific in 1929 en route to Yokohama after wintering at Sealevel, Alaska. The boat was to have been broken up at the end of the voyage and the fact that a woman was aboard her from Houston to Panama caused the superstitious to speculate.

As no one returns to tell the tale, we have to guess at the reason for a ship disappearing. Overloading or bad stowage are two of the causes, and steering gear often carries away in a gale, leaving the ship broached to. Her wooden hatches are stove in and she fills. Hatches are the weak spot in all cargo ships, for they are made of wood covered with tarpaulins, both of which are perishable and easily damaged. Steel hatches are coming into use, just as aluminum life boats will be common practice soon. If no water can enter a ship and her top weight is reduced she has a chance of coming through all kinds of weather. It will not be long before every ship that clears for sea will be compelled by law to carry wireless and competent operators. There is no excuse nowadays for a ship to sail beyond the reach of human aid or to go down in darkness without sending out a call.

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Statistics show that the average non-commercial driver of a motor car has a severe accident once in 50 years, reports Dr. H. C. Dickinson of the National Bureau of Standards to the Highway Research Board. Persons having ten times as many accidents as the average are now regarded as accident-prone drivers.

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Seversky, Flying Inventor

[*Continued from page* 119]

too hazardous and I was forbidden to make the necessary experiments."

Seversky left the Air Corps in 1922 in order that he might devote his entire time to development of his inventions. Being a military man, his thoughts have been directed chiefly to aerial warfare. One of his first creations was a plane having roller skis, which he designed, built, and demonstrated to the government. This novel landing gear enabled aircraft to take off from rough, ploughed ground, and to safely pass over small ditches.

Other outstanding Seversky inventions include a large caliber non-recoil gun for pursuit planes, automatic drift control devices, illumination of landing fields, universal landing gear for aircraft, amphibian landing gear, hydraulic shock absorbers for aircraft, hydraulic retractable landing gear, retractable landing gear for high-wing monoplanes, all-metal amphibian designs, all-metal, skin-stressed wing structures, methods of mass production of metal planes, automatic anchoring devices for seaplanes and flying boats,

Invented by Major P. de Seversky, noted flier, this seaplane anchor is operated from pilot's cockpit by cable and windlass. Retracted, it forms nose of landing gear pontoon.

a novel air-brake and wing-flap, split water rudders to enhance maneuverability of seaplanes on water, folding all-metal monoplane wings, and many others.

Seversky formed his own aviation company, located at Farmingdale, L. I., in 1931.

Last June, Seversky was awarded an Army contract for 77 single-seater pursuit planes. Although no official performance figures were released, experts estimate that the planes will exceed 300 m. p. h. in speed. A two-seater pursuit-trainer designed by Seversky has also resulted in contracts from the Air Corps.

During his activities as an inventor and designer of aircraft and aircraft devices, Major de Seversky has continued to fly and is ranked among the leading pilots of America.

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Conquering Grand Coulee

[*Continued from page 64*]

and stone in order to reach bedrock. In the meantime, work on the east side of the dam has been in progress.

Here an unusual engineering problem presented itself. A vast bank of mud, 200,000 cubic yards of sluggish, slimy dirt and sand, kept moving down into the excavation as fast as the steam shovels and the moving-belt conveyor could remove it.

It looked for awhile as though the work on the dam would be delayed for months. Bedrock on this side of the river is 175 feet below the water level, and with the mud constantly sliding in, it looked like an impossible task.

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The contractors were given until 1940 to complete the dam, but present indications are that the work will be done by February or March of 1938. The saving of time is largely accounted for by the installation of the elaborate moving belt machinery for removing waste from the dam site and bringing in the materials for the dam. The work goes on day and night; the rumble of the conveyor belts never ceases.

The dam is being built as a project of the Bureau of Reclamation, Interior Department. So far, funds have been provided for the building of the base of the dam, which of course is a dam in itself.

More appropriations are expected from the present session of congress. Coulee Dam has been a favored administration project, and administration's recent overwhelming endorsement at the polls is pretty clear indication that the Coulee Dam will not lack funds for its completion. The dam is part of a chain of power dams eventually planned for the Columbia. A second dam in the chain, the Bonneville Dam near Portland, is almost completed.

The contracting company has brought in its own engineers and specialists, of course, but the bulk of the labor is provided by the WPA from among Washington state unemployed. The number on the job runs as high as 6,000, varying with the work done and the season.

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[*Continued on page 163*]

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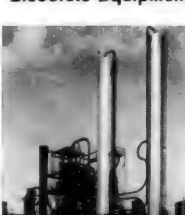

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Conquering Grand Coulee

[*Continued from page 157*]

backed the project for years found a champion in the late Dr. Elwood Mead, Commissioner of Reclamation for more than a decade. The present Commissioner is John C. Page, formerly head of the engineering division of the bureau and a veteran with experience on the Boulder Grand Valley and other projects. Government engineers immediately in charge of the Grand Coulee are R. F. Walter, chief engineer of the Bureau of Reclamation, with offices in Denver; J. L. Savage, chief designing engineer, also of Denver; and Frank A. Banks, construction engineer in direct charge of the project, with headquarters at the dam.

The death toll on the project, so far, has averaged about one life each month. A corps of safety engineers is on the job at all times to prevent accidents.

On one side of the river is Mason City, the contractor's town, housing several thousand. It has homes for married couples, model bunk houses for the men, a trading company which is a department store and which sells at standard prices, a motion picture theater, a ball park and a recreation hall with the longest bar north of Mexico. Only beer is sold there.

Across the river is the government town; permanent homes for the Bureau of Reclamation engineers and inspectors. This will be the home of those who operate the dam and its immense power house in future years. On the nearby hills are boom towns, with the wild west atmosphere found in such communities.

Construction of the Grand Coulee dam comes as the climax of the greatest dam building era in history. Until 1933, the Assuan dam and reservoir in the Nile of Egypt was the largest of its kind in the world. It held one and a third trillion gallons or 4,049,200-acre feet of mountain water.

Next came the Boulder Dam in the Colorado River. It was designed to store 30,500,000-acre feet of water, more than seven times as much as its Egyptian rival. Norris Dam in the Clinch River, near Knoxville, approached the Assuan capacity with 3,592,132-acre feet. Though there is some argument as to how the height of dams should be measured, the gravity arch concrete Boulder Dam, 726 feet high, is the highest in the world.

The Fort Peck Dam on the Missouri River in Montana will be but 242 feet high but it will be the largest earth fill dam in the world. The main section will be 9,000 feet long. The dam will contain approximately 100,000,000 cubic yards of earth, 1,600,000 cubic yards of rock and 4,000,000 cubic yards of gravel. The reservoir created by the dam will store 19,412,000-acre feet of water. It is being built by the War Department's Corps of Engineers.

Mighty as these dams are, however, the Grand

[*Continued on page 167*]

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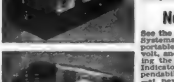

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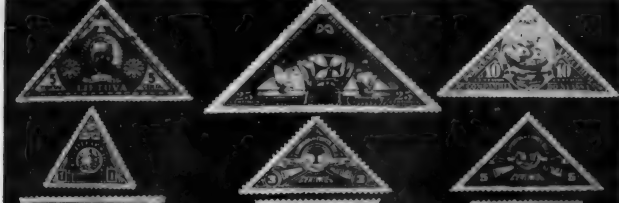
DOG HAS PASSPORT!—TO FACILITATE HIS SHIPMENT, BIG BOY, A BOSTON TERRIER OWNED BY FLETCHER WARREN, U.S. CONSUL AT RIGA, LATVIA, HAS A PASSPORT BEARING HIS PHOTOGRAPH AND PEDIGREE. *Hazel Johnson, New York, N.Y.*

KILLED AND FINED!—A SIGN NEAR THE AUSTRIAN BORDER AT KLAGENFURT WARNS THAT PERSONS TOUCHING POWER LINES WILL NOT ONLY BE KILLED BUT WILL BE FINED FROM 100 TO 500 SHILLINGS. *Louis Hodor, Ishpeming, Mich.* Nic Sprank

NATURAL AMPLIFIER!—ECHO CANYON IN THE CAPEL BACK MOUNTAINS OF ARIZONA FUNCTIONS AS A NATURAL AMPLIFIER, HURLING BACK SHOUTS, SONGS AND MUSIC. SINGERS AND MUSICIANS FREQUENTLY VISIT THE PLACE.—*Carlton Grant, Phoenix, Ariz.*

Five dollars will be paid for the oddity used by Nic Sprank as his central illustration. One dollar will be paid for all others used on this page. Send your oddity to Nic Sprank, Modern Mechanix Publishing Company, Fawcett Bldg., Greenwich, Conn. Source or proof of each oddity must be given. Send all oddities separately, not with other manuscripts or letters.

Triangle Stamps Issued By Many Countries



Although just a few years ago the triangle stamp was found only in the collections of philatelists with unlimited incomes it is now a common issue of many countries as these examples indicate. With many nations issuing these novel three cornered stamps any stamp collector can start an interesting collection at an investment of less than one dollar. Here are shown the triangle stamps issued by Spain, Guatemala, Costa Rica, Germany, Latvia, Finnland and Nyassa. The stamps are of varied sizes and are printed in brilliant colors.

ADLETS FOR HOBBYISTS

(See regular classified section for rates and other information.)

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SUPER-WONDER Packet offered, containing 60 different stamps from Afghanistan, Transjordania, North Borneo, Manchukuo, Sudan, Macao, Iraq, Charkhari, French and British Colonies, including natives, beasts, ships, etc., all for 5c to approval applicants. Big illustrated lists included. Kent Stamp Company, Box 872 (G. F. O.), Brooklyn, N. Y.

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Just the thing for a game of Flinch or Rook or for a setting of Flinch or Rook or for a setting of Flinch or Rook or for a setting

Conquering Grand Coulee

[*Continued from page 163*]

Coulee exceeds them all in at least one respect. As has been mentioned, it is to be bigger than the Great Pyramid. Its volume of 11,250,000 cubic yards of concrete masonry, in fact will be four times the volume of the Great Pyramid and three and a half times that of Boulder Dam.

Grand Coulee's huge mass of concrete will weigh 23,000,000 tons. The base of the dam covers 34 acres. A spillway 1,654 feet long with a capacity of 1,000,000 cubic feet per second will be provided. The dam will form a reservoir which will extend 151 miles to the Canadian border. It will have a capacity of 9,610,000-acre feet of water, not so much as Boulder but more than the amount held by Assuan. Water stored in the Grand Coulee reservoir will be used to irrigate a body of land comprising 1,200,000 acres, an area as large as the State of Delaware.

It has been estimated that completion of the vast undertaking and its affiliated projects will provide homes for 1,400,000 persons and virtually double the population of the State of Washington. The dam will be finished within the next three years at the latest but the entire Columbia Basin project, comprising irrigation, power development, river regulation, flood control, and improvement of navigation will require from 40 to 50 years for completion.

New Explosive From Corn

Corn may find still another extensive industrial use, as ultimate source of a new type of explosive. This outlook is opened up by researches of James A. Frorer, young Wilmington, Del., chemist.

The explosive itself is made by nitrating a hitherto rare chemical known as mannitol. Mannitol bears much the same relation to the rare sugar mannite that glycerin bears to glucose. Mannite, hitherto expensive even in small quantities, can now be made in tons from glucose or corn sugar, which in turn is made from cornstarch.

Nitrated mannitol, which is chemically more or less analogous to nitroglycerin, is expected to be of industrial rather than military importance as an explosive. Mannitol may also find an even greater usefulness in electrical condensers.

"Black As Ebony" Is An Error

Black as ebony is the height of blackness in literary figures of speech. But botanists at the Field Museum of Natural History in Chicago say that real ebony varies from jet black or purplish black to streaked or patchy tones. The ebony woods brought to the commercial world to be made into violin bridges, piano keys, umbrella handles, and other articles, range through these dark variations of color.

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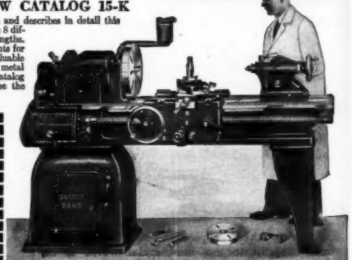

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SOUTH BEND *Precision* LATHES

FUN for EVERYONE OWN a 1-TUBE WORLD WIDE Ace RADIO

ONLY $1.55 POST PAID

A sensational Radio! Thousands now in use. Can actually bring in foreign stations, police calls, aeroplanes, amateurs, etc., as well as local broadcasts! **Short** and **Long Wave.** Ace Radios give guaranteed **results!**

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ALL-ELECTRIC two tube house current set. No batteries! Complete kit $3.00.

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Sensational PRINT-O-PRESS. Prints Post Cards and up to 8½x11 letters. Many advance features. Fully warranted. Agents write.

$9.95 COMPLETE

Does Work of $150 Machines

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He came in the guise of a lover to mask the heart of a fiend. Slowly, stealthily he exerted his strange power until the girl, young and lovely, was doomed to a fantastic slavery. Then to his aid he summoned the Yellow Death.

Read this thrilling real life drama of warped passion and tortured innocence in

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UNMASKING NEW ENGLAND'S BOUDOIR BANDIT

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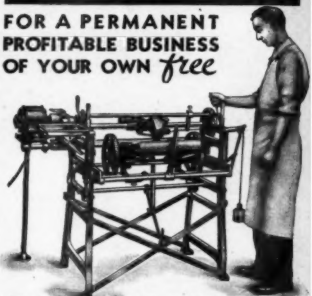
FOR A PERMANENT PROFITABLE BUSINESS OF YOUR OWN *free*



MAKE $30 TO $40 A WEEK

Our free plans show you how to build a successful business of your own sharpening lawnmowers. Positively no experience necessary. Most men average from $30 to $40 a week. J. B. Van Dien, writes: "Some weeks I earned $40 a week with my Ideal just as a side line." H. Greenlau, writes: "In May I sharpened over 200 mowers at $1.00 each." Niles C. Race, writes: "I have sharpened 785 mowers at $1.00 each."

THE IDEAL LAWN MOWER SHARPENER

Makes old, dull lawnmowers cut like new. Mowers run easier, stay sharp longer—customers come back year after year. Start right at home. Attach the Ideal to your lamp socket. Sharpens any make of mower in 15 to 20 minutes—you get $1.00 to $1.50. Attachments for grinding skates, grass shears, hedge shears, sickles, scythes, axes, etc.

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THE FATE-ROOT-HEATH CO.

337 Bell St., Plymouth, Ohio

Earn Cash *at* Home!

We paid M. M. $267 in 3 weeks for exceptional "cellar crop" patented mushrooms! Big free picture book tells if your cellar, shed, barn suitable. We buy all crops thru ten branches. Write today. (Estab. 1908.)

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MANY SOCIAL SECURITY JOBS

SALARY TO START $90 to $175 MONTHLY

MEN.. WOMEN

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- Customs Inspector
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- Spec. Investigator
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- POSTMASTER
- Elevator Conductor
- Auditor
- Stenographer
- U. S. Border Patrol
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- Watchman
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- Secret Service Opr.
- File Clerk

INSTRUCTION SERVICE, Dept. 233, St. Louis, Mo.

Send me FREE particulars about Social Security jobs, "How to Qualify for Government Positions" marked "X". Salaries, locations, opportunities, etc. ALL SENT FREE.

Name .....

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Expanding Business Greets New Ideas

Featuring a lamp and hearing aid in one, this sonotone device is a welcome furnishing in homes of persons who are hard of hearing. Microphone in lamp base transmits sounds to ear bone oscillator located at end of extension cord.

A new fender hammer weighing 14 pounds, pneumatically powered, which can be operated with any air compressor delivering 75 pounds or more pressure. Delivers 4,000 blows per minute at full speed.

A handy clothes dryer that can be clamped on an oven door to utilize heat from the oven without burning clothes.

A clear sealer and wood preservative of synthetic resins that prevents grain raising, making it possible to decorate woods treated with it with a minimum of paint and hand sanding.

A streamlined gear-driven **electric fan.**

A radio receiver featuring a telephone-like tuning dial.

This new low-priced model E Cine-Kodak movie camera for 16 mm. films incorporates a film footage indicator within the view finder and has three operating speeds.

A gyro-magnetic compass that performs the double function of pointing north and orienting the gyro by bringing precessional forces to bear upon it. A contribution to greater safety in flying.

A low-priced hearing aid device employing both bone and air conduction principles.

A multiple writer device attached to any standard typewriter produces two to four originals in place of carbon copies.

A wire cable measuring meter capable of measuring 5,000 feet per minute.

Cooking heat and space heating are provided by this compact double-duty trailer oil stove. The fuel reservoirs and cooking top are completely enclosed when not in use.

Reversible asbestos mittens designed for heavy duty work where hands must be protected against intense heat.

A 300-watt electric light bulb mounted on a regular size screw base.

A vaporizing device fitted with a blow tube attachment that closes passages to lungs when blowing and gently forces warm vapor produced by the breath to sinus cavities and ear passages. Any favorite vaporizing solution can be used.

A doublet radio antenna designed for efficient reception of radio signals from all directions. Eliminates much man-made static.

A crystal pickup microphone for phonographs that reduces tracking error from 15 degrees to 1.5 degrees. Free from mechanical resonance.

A flux for low temperature brazing that does not flow away under the torch.

This thermostatic heater device automatically turns on cold auto engine and stops it when warmed up, eliminating danger of winter freezing while automobile is parked.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to Modern Mechanix Publishing Co., Information Bureau, Fawcett Building, Greenwich, Connecticut. Manufacturers are invited to submit material for publication on this page.